

**SONY**

VIDEOCASSETTE PLAYER

**BVW-22P**



**BETACAM SP**™

MAINTENANCE MANUAL

Volume 1 2nd Edition

Serial No. 10950 and Higher

このマニュアルに記載されている事柄の著作権は当社にあり、説明内容は機器購入者の使用を目的としています。従って、当社の許可なしに無断で複写したり、説明内容(操作、保守等)と異なる目的で本マニュアルを使用することを禁止します。

The material contained in this manual consists of information that is the property of Sony Corporation and is intended solely for use by the purchasers of the equipment described in this manual.

Sony Corporation expressly prohibits the duplication of any portion of this manual or the use thereof for any purpose other than the operation or maintenance of the equipment described in this manual without the express written permission of Sony Corporation.

Le matériel contenu dans ce manuel consiste en informations qui sont la propriété de Sony Corporation et sont destinées exclusivement à l'usage des acquéreurs de l'équipement décrit dans ce manuel.

Sony Corporation interdit formellement la copie de quelque partie que ce soit de ce manuel ou son emploi pour tout autre but que des opérations ou entretiens de l'équipement à moins d'une permission écrite de Sony Corporation.

Das in dieser Anleitung enthaltene Material besteht aus Informationen, die Eigentum der Sony Corporation sind, und ausschließlich zum Gebrauch durch den Käufer der in dieser Anleitung beschriebenen Ausrüstung bestimmt sind.

Die Sony Corporation untersagt ausdrücklich die Vervielfältigung jeglicher Teile dieser Anleitung oder den Gebrauch derselben für irgendeinen anderen Zweck als die Bedienung oder Wartung der in dieser Anleitung beschriebenen Ausrüstung ohne ausdrückliche schriftliche Erlaubnis der Sony Corporation.

## TABLE OF CONTENTS

### 1. INSTALLATION

1-1. Operational Environment .....	1-1
1-2. Electrical.....	1-1
1-3. Installation Space .....	1-2
1-4. Connection Connectors .....	1-3
1-5. Output Signals of the Connector .....	1-3
1-6. Select Switch Setting .....	1-4
1-7. Rack Mounting .....	1-5
1-8. Supplied Accessories .....	1-7
1-9. Optional Accessories .....	1-7

### 2. TECHNICAL INFORMATION

2-1. Specifications.....	2-1
2-2. Location of the Printed Circuit Boards .....	2-4
2-3. Location of the Main Mechanical Parts/Components .....	2-7
2-4. Location of the Sensors .....	2-9
2-5. Functions of the Sensors and Cassette Tab .....	2-11
2-5-1. Function of the Sensors .....	2-11
2-5-2. Function of the Cassette Plug and Tab .....	2-12
2-6. Printed Circuit Boards.....	2-14
2-7. Self Diagnosis Function .....	2-15
2-8. Timing Chart .....	2-19

### 3. PERIODIC CHECK AND MAINTENANCE

3-1. System Control Operation Check .....	3-1
3-2. Digital Hours Meter.....	3-3
3-2-1. Outline.....	3-3
3-2-2. Mode Selection .....	3-3
3-2-3. Description of the Display Mode .....	3-3
3-3. Maintenance after Repairs.....	3-4
3-3-1. Cleaning Procedure of the Video Head .....	3-4
3-3-2. Cleaning Procedure of the Stationary Heads .....	3-4
3-3-3. Cleaning Procedure of the Tape Movement Areas .....	3-4
3-4. Periodic Check.....	3-5

### 4. SERVICE INFORMATION

4-1. Removal of Cabinet .....	4-1
-------------------------------	-----

4-2. Removal/Installation of Cassette-up Compartment.....	4-2
4-3. Removal of the Power Block .....	4-2
4-4. Spare Parts .....	4-3
4-5. How to Operate the Unit without Installing cassette tape .....	4-3
4-6. How to Remove a Cassette when the Tape is Slackened in the Unit .....	4-4
4-7. How to Check the Reel Table Operation .....	4-5
4-8. Note for Check and Maintenance of Printed Circuit Board .....	4-5
4-9. Service of the Circuit Board .....	4-5
4-10. How to Remove the Detection Switches .....	4-8
4-11. Note for the Slip Ring .....	4-9
4-12. How to Open the Cassette Lid .....	4-9
4-13. Fixture.....	4-10

### 5. REPLACEMENT OF MAJOR PARTS

5-1. Replacement of the Reel Motor.....	5-1
5-2. Replacement of the Reel Table .....	5-2
5-3. Replacement of the Reel Table Transfer Motor .....	5-3
5-4. Replacement of the Reel Table Transfer Belt .....	5-3
5-5. Replacement of the Motor Plate Assembly.....	5-4
5-6. Replacement of the Reel Table Brake .....	5-5
5-7. Replacement of the Upper Drum .....	5-6
5-8. Replacement of the Drum Assembly.....	5-8
5-9. Replacement of the Brush Assembly.....	5-9
5-10. Replacement of the Capstan Motor .....	5-9
5-11. Replacement of the Audio/TC Head.....	5-10
5-12. Replacement of the CTL Head .....	5-11
5-13. Replacement of the Tension Regulator Block .....	5-12
5-14. Replacement of the Supply Tension Roller .....	5-13
5-15. Replacement of the Pinch Solenoid .....	5-14
5-16. Replacement of the Threading Motor .....	5-15

5-17. Replacement of the Pinch Roller .....	5-15
5-18. Replacement of the Threading Ring .....	5-16
5-19. Replacement of the Cassette-up Compartment Worm Gear .....	5-17
5-20. Replacement of the Cassette-up Compartment Motor .....	5-18
5-21. Items to Be Adjusted after Main Parts Replacement .....	5-19

## 6. LINK AND DRIVE SYSTEM ALIGNMENT

Alignment Information .....	6-1
6-1. Reel Table System Adjustment .....	6-3
6-1-1. Cassette Holder Height Adjustment (L) .....	6-3
6-1-2. Cassette Holder Height Adjustment (S) .....	6-4
6-1-3. Reel Motor Shaft Slantness Adjustment .....	6-5
6-1-4. Reel Table Height Adjustment ....	6-6
6-1-5. Reel Table Rotation Detector Block Position Adjustment .....	6-7
6-2. Brake System Adjustment .....	6-8
6-2-1. Reel Table Brake Clearance Adjustment .....	6-8
6-2-2. Reel Table Brake Release Adjustment .....	6-8
6-3. Tension Regulator System Adjustment .....	6-9
6-3-1. Tension Regulator Arm Position Adjustment .....	6-9
6-3-2. Tension Regulator Arm Slantness Adjustment .....	6-10
6-4. Threading Ring Rotation Adjustment .....	6-11
6-5. Gear Box Position Adjustment .....	6-12
6-6. Pinch Roller Press Block Position Adjustment .....	6-13
6-7. Tension Sensor Position Adjustment .....	6-14
6-8. Tension Sensor Sensitive Adjustment .....	6-15

## 7. TORQUE ALIGNMENT

Alignment Information .....	7-1
7-1. Brake Torque Check .....	7-3
7-1-1. S Brake Torque Check .....	7-3
7-1-2. T Brake Torque Check .....	7-3
7-2. Reel Torque Adjustment .....	7-4

7-2-1. Reel Zero Gram Torque Adjustment .....	7-4
7-2-2. Reel 150 Gram Torque Adjustment .....	7-5

## 8. TAPE RUN ALIGNMENT

Alignment Information .....	8-1
8-1. Video Tracking Adjustment .....	8-5
8-2. Audio/TC Head Adjustment .....	8-8
8-2-1. Audio/TC Head Height Adjustment .....	8-8
8-2-2. Audio/TC Head Zenith Adjustment .....	8-10
8-2-3. Audio/TC Head Azimuth Adjustment .....	8-11
8-2-4. Audio/TC Head Phase Adjustment .....	8-12
8-2-5. Audio/TC Head Position Adjustment .....	8-13
8-3. CTL Head Adjustment .....	8-14
8-3-1. CTL Head Height Adjustment .....	8-14
8-3-2. CTL Head Azimuth/Zenith Adjustment .....	8-15
8-3-3. CTL Head Position Adjustment .....	8-16
8-4. T Drawer Guide Block Tape Run Adjustment .....	8-17
8-5. Slip Ring Brush Position Adjustment .....	8-18

## 9. POWER SUPPLY AND SYSTEM CONTROL ALIGNMENT

9-1. Switching Regulator Adjustment .....	9-1
9-1-1. REG +12V Adjustment .....	9-1
9-2. System Control Adjustment .....	9-1
9-2-1. Half H Mute Pulse Width Adjustment .....	9-1
9-2-2. Character V Position Adjustment ..	9-2
9-2-3. Character Position Adjustment .....	9-2

## 10. SERVO SYSTEM ALIGNMENT

10-1. Reel FG Adjustment .....	10-2
10-2. Tension Sensor Applied Voltage Adjustment .....	10-2
10-3. Tension Sensor Amp Offset Adjustment .....	10-3
10-4. Capstan Drum Free Speed Adjustment .....	10-3
10-5. Tracking Control Center Adjustment ..	10-4
10-6. Y RF Switching Position Adjustment (1) .....	10-5

10-7. Y RF Switching Position Adjustment (2) .....	10-6
10-8. C RF Switching Position Adjustment .....	10-7

## 11. AUDIO SYSTEM ALIGNMENT

11-1. LNG Level Tentative Adjustment .....	11-2
11-2. Frequency Response Adjustment .....	11-2
11-3. LNG Level Adjustment .....	11-3
11-4. AFM Carrier Frequency Adjustment .....	11-4
11-5. AFM Level Adjustment .....	11-4

## 12. VIDEO SYSTEM ALIGNMENT

12-1. Y RF Equalizer Adjustment .....	12-3
12-2. Chroma RF Equalizer Adjustment .....	12-3
12-3. Chroma RF Balance Tentative Adjustment .....	12-4
12-4. Y RF Balance Tentative Adjustment .....	12-4
12-5. Y RF AGC HF Input Adjustment .....	12-4
12-6. Chroma RF AGC HF Input Adjustment .....	12-5
12-7. Y Phase Equalizer Adjustment .....	12-5
12-8. Y Level Adjustment .....	12-6
12-9. Chroma Level Adjustment .....	12-6
12-10. Chroma Carrier Balance Adjustment .....	12-7
12-11. Y Carrier Balance Adjustment .....	12-7
12-12. Y Frequency Response Adjustment .....	12-8
12-13. Chroma Frequency Response Adjustment .....	12-8
12-14. Y RF Balance Adjustment .....	12-9
12-15. Chroma RF Balance Adjustment .....	12-9
12-16. Y Drop Out Replacement Adjustment .....	12-10
12-17. Chroma Drop Out Replacement Adjustment .....	12-10
12-18. Y Input Signal Adjustment .....	12-11
12-19. Y Nonlinear De-emphasis Adjustment .....	12-12
12-20. Y Noise Canceller Adjustment .....	12-13
12-21. Y Double Noise Canceller Adjustment .....	12-14
12-22. Y Single/Double Noise Canceller Output Adjustment .....	12-15
12-23. Pre- $\phi$ CCD Linearity Adjustment .....	12-16
12-24. Pre- $\phi$ CCD Output Level Adjustment .....	12-16
12-25. Chroma Nonlinear De-emphasis Adjustment .....	12-17
12-26. Chroma Noise Canceller Adjustment .....	12-18
12-27. Chroma Noise Canceller Output Level Adjustment .....	12-19
12-28. Chroma AFC 1/8 Clock Adjustment .....	12-19

12-29. Y AFC 1/8 Clock Adjustment .....	12-19
12-30. Pre- $\phi$ Chroma SH Adjustment .....	12-20
12-31. Pre- $\phi$ Y SH Adjustment .....	12-20
12-32. Pre- $\phi$ Limiter Adjustment .....	12-21
12-33. Expand CCD Linearity Adjustment .....	12-22
12-34. Expand CCD Output level Adjustment .....	12-23
12-35. Video Output Level Adjustment .....	12-23
12-36. Y Sync Replacement Adjustment .....	12-24
12-37. Y Output Level Adjustment (Y/C Monitor) .....	12-24
12-38. 4.43MHz OSC Adjustment .....	12-25
12-39. Clamp Adjustment .....	12-25
12-40. SC Tuning Adjustment .....	12-26
12-41. U/V Level Adjustment .....	12-26
12-42. Clamp Pulse Adjustment .....	12-27
12-43. Chroma Blanking Adjustment .....	12-27
12-44. Chroma Carrier Balance Adjustment .....	12-28
12-45. Chroma Balance Vertical Adjustment .....	12-28
12-46. Burst Balance Adjustment .....	12-29
12-47. Chroma Balance Adjustment .....	12-29
12-48. Burst Level Adjustment .....	12-30
12-49. Chroma Output Level Adjustment (Y/C Monitor) .....	12-30
12-50. Chroma Video Output Level Adjustment .....	12-31
12-51. Y/C Delay Adjustment .....	12-31
12-52. False H Sync Frequency Adjustment .....	12-32
12-53. Free-run Timing Adjustment .....	12-32
12-54. H Lock SC VCO Error Adjustment .....	12-33
12-55. H Lock SC VCO Delay Adjustment .....	12-33
12-56. Y Frequency Response Check (Metal) .....	12-34
12-57. Chroma Frequency Response Check (Metal) .....	12-35
12-58. Y Frequency Response Check (Oxide) .....	12-36
12-59. Chroma Frequency Response Check (Oxide) .....	12-37

## Volume 2

### 13. BLOCK DIAGRAMS

### 14. SEMICONDUCTOR ELECTRODES

### 15. SCHEMATIC DIAGRAMS

### 16. PRINTED WIRING BOARDS

### 17. SPARE PARTS AND FIXTURE



## **SECTION 1 INSTALLATION**

Be sure to install the BVW-22P in locations satisfying the required operational environment described below to assure the BVW-22P's superior performance and to maintain the excellent serviceability and accessibility.

### **1-1. OPERATIONAL ENVIRONMENT**

**1. Operating temperature:**

5° C to 40° C

(Good air circulation is essential to prevent internal heat build-up. Place the unit in locations with sufficient air circulation. Do not block the ventilation holes on the cabinet.)

**2. Storage temperature:**

-20° C to +60° C

**3. Locations to avoid:**

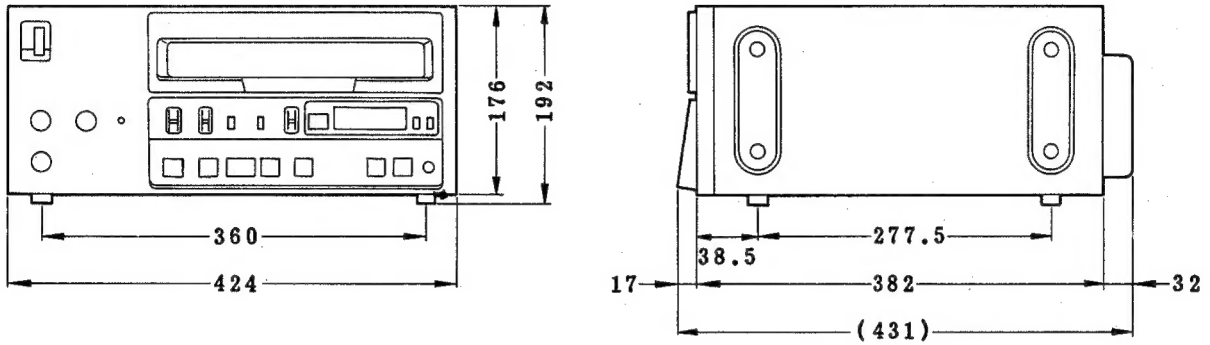
- . Areas where the BVW-22P will be exposed to direct sunlight or any other strong lights.
- . Dusty areas or areas where it is subject to vibration.
- . Areas with strong electric or magnetic fields.
- . Areas near heat sources.

### **1-2. ELECTRICAL**

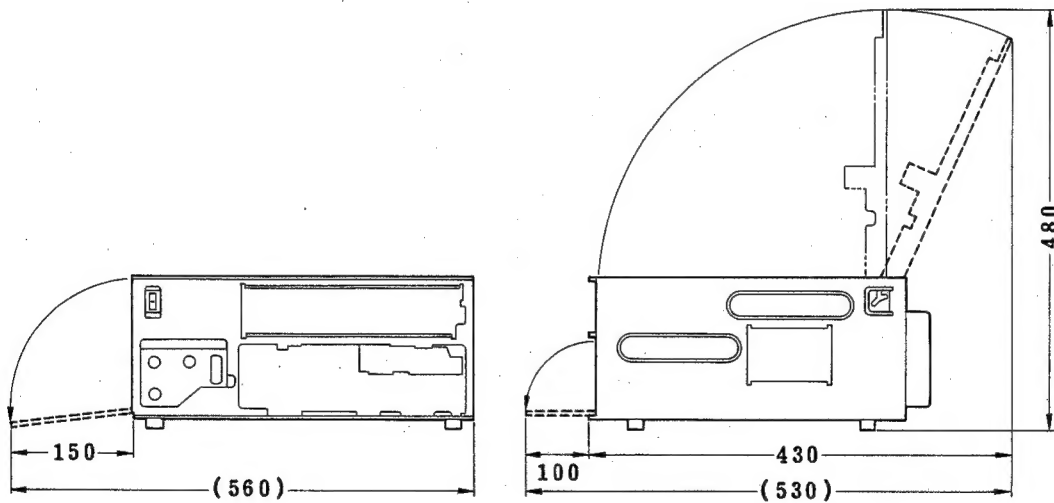
- . Power requirements: AC 220 - 240 V, 50 / 60 Hz
- . Operating Voltage: AC 198 - 264 V
- . Power consumption: 56 W

### 1-3. INSTALLATION SPACE

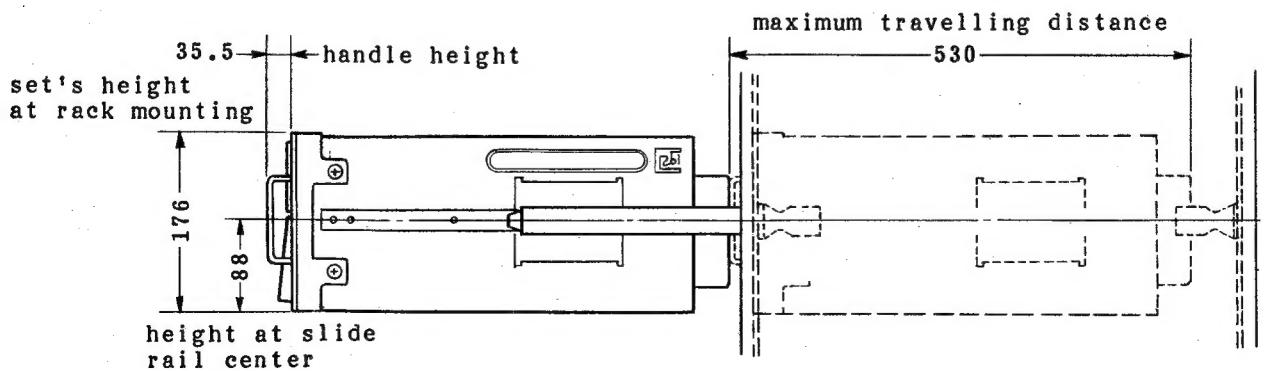
#### 1. Outer Dimensions.



#### 2. Service Operating Dimensions



#### 3. When Rack-mounted



Unit: mm



#### 1-4. CONNECTION CONNECTORS

When external cables are connected to the various connectors on the rear panel during maintenance, the hardware listed below (or equivalents) must be used.

Panel Indication	Connection Connector
VIDEO OUTPUT (BNC)	1-560-069-11 PLUG, BNC, MALE
RF OUT	1-508-459-00 AERIAL
MONITOR	1-506-161-00 CONNECTOR, 8P, MALE

#### 1-5. OUTPUT SIGNALS OF THE CONNECTOR

VIDEO OUTPUT :BNC and Pin Jack in each  
Composite video, 1.0 Vp-p, 75 ohms,  
sync negative

RF OUT :IEC-type standard aerial connector  
UHF channel 30 to 39 adjustable, system I/G selectable

#### AUDIO OUTPUT

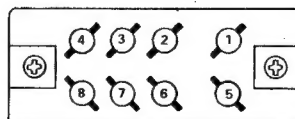
CH-1/3, CH-2/4 :Pin Jack x 2  
-10 dBs, 47 kohms, unbalanced

MONITOR :Pin Jack x 1  
-5 dBs, 47 kohms, unbalanced

#### MONITOR

Pin No.	Output Signal
1	AUDIO MONITOR OUT (X)
2	VIDEO OUT (X)
3	_____
4	_____
5	AUDIO MONITOR OUT (G)
6	VIDEO OUT (G)
7	_____
8	_____

(external view)



MONITOR

## 1-6. SELECT SWITCH SETTING

Along with the select switches on the Front Panel, there are system select switches on the circuit boards. These switches must be set according to operating condition.

### SY-121A Board

#### S1: MANUAL OPERATION SELECT switch of TAPE DIRECTION

(Used for the alignment at the factory.)

This switch selects the operation of the tape direction in Tape Beginning Sensor and Tape End Sensor Adjustments.

ON: Normal setting

OFF: Enable the manual selection

When the set is shipped, this switch is set to the ON position.

#### S2: L/S CASSETTE MODE SELECT switch

This switch selects the reel table position L or S without installing cassette-up compartment.

L: L cassette mode

S: S cassette mode

When the set is shipped, this switch is set to the S position.

#### S3: SUPERIMPOSE CHARACTER POSITION SELECT switch

UPPER: Display the superimposed character to the upper position.

LOWER: Display the superimposed character to the lower position.

### SV-99 Board

#### S1: ADJUSTMENT ITEM SELECT switch

(Used for the servo and mechanical adjustment.)

Adjustment item is selected by this switch.

NOTE: This switch cannot function without shorting between TP11 and GND on the SV-99 Board.

#### S2: ADJUSTMENT ITEM MEMORIZE switch

(Used for the servo and mechanical adjustment.)

Adjustment item is selected by switch S1, and the selected data is memorized in the memory by pressing this switch.

NOTE: This switch cannot function without shorting between TP11 and GND on the SV-99 Board.

#### S3, S4: LONG PAUSE TIME SELECT switch

Long Pause time is selected by these switches setting.

	1 sec	18 sec	1 min	9 min
S3	0	1	0	1
S4	0	0	1	1

When the set is shipped, these switches are set as follows: S3: 0

S4: 1

### AU-101A Board

#### S101: CH-1 PB EQ SELECT switch

#### S201: CH-2 PB EQ SELECT switch

These switches are used for the audio PB frequency response adjustment.

### DM-74 Board

#### S2: Y DOC ADJUSTMENT switch

When the set is shipped, this switch is set to the ON position.

#### S3: RF EQUALIZER ADJUSTMENT switch

When the set is shipped, this switch is set to the ON position.

#### S201: C PHASE EQUALIZER ADJUSTMENT switch

When the set is shipped, this switch is set to the ON position.

#### S202: C DOC ADJUSTMENT switch

When the set is shipped, this switch is set to the ON position.

### EN-66A Board

#### S1: C NOISE CANCELLER ADJUSTMENT switch

When the set is shipped, this switch is set to the ON position.

#### S2: PB CTDM ON/OFF switch

When the set is shipped, this switch is set to the ON position.

#### S301: Y NOISE CANCELLER ADJUSTMENT switch

When the set is shipped, this switch is set to the ON position.

**S303: CHROMA OUTPUT ON/OFF switch**

ON: Color

OFF: Black and white

When the set is shipped, this switch is set to the ON position.

**S304: PB Y ON/OFF switch**

When the set is shipped, this switch is set to the ON position.

**S305: Y NOISE CANCELLER ADJUSTMENT switch**

When the set is shipped, this switch is set to the ON position.

**S306: NOISE CANCELL DOUBLE/SINGLE SELECT switch**

This switch selects the noise cancell mode.

When the set is shipped, this switch is set to the DOUBLE position.

**KY-130 Board**

**S17: AGING MODE SELECT switch**

(This switch is applied for Serial No.10189 and higher.)

When the set is shipped, this switch is set to the NORMAL position.

**1-7. RACK MOUNTING**

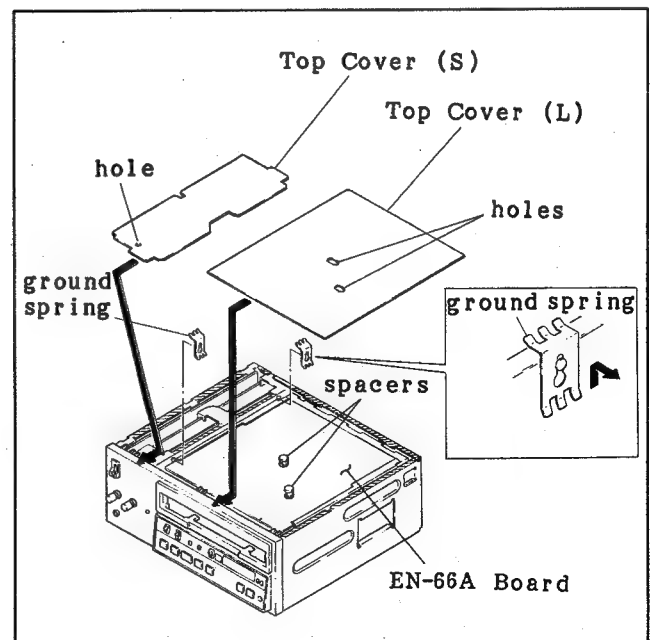
The unit can be mounted in the 19-inch standard rack. It is recommended to use the Rack Mount Kit, RMM-507, optional accessory (including the slide rails, the handle bracket and fixing screws).

1. Remove a U Case. ( Refer to Sec. 4-1.)
2. Remove the two ground springs.
3. Install the supplied Top Covers on top of the unit.

**Top Cover (L):** Set the frosted side of the Top Cover (L) to upward.

Insert the edges of the Top Cover (L) under the shaded portions of the chassis as shown in figure by bending it so that the two holes of the Top Cover (L) fit to the spacers on the EN-66A board.

**Top Cover (S):** Set the frosted side of the Top Cover (S) to upward. Insert the edges of the Top Cover (S) under the shaded portions of the chassis as shown in figure by bending it so that the hole is positioned to the front panel side.

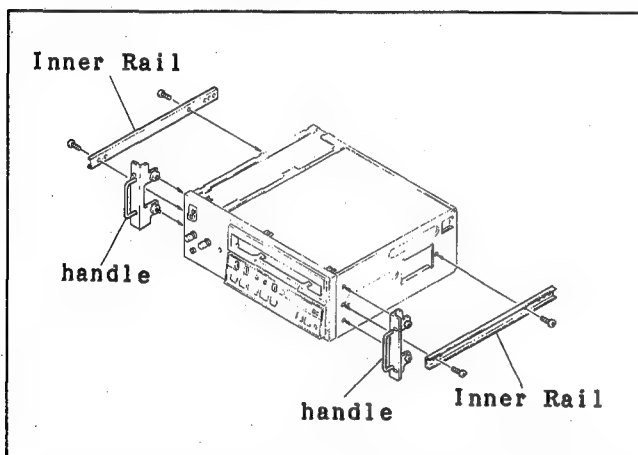


(NOTE) (1) The Top Covers (L) and (S) should be installed.

(2) Never put the material on the Top Covers (L) and (S), and push it down by any forth.

(3) Never use the Upper Plate supplied with RMM-507.

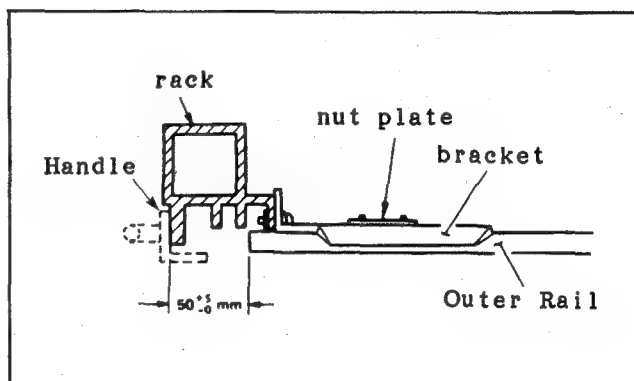
4. Mount the Inner Rails of the guide rails with supplied four screws (B 4 x 8) into RMM-507 to both right and left sides of the unit, and mount the two handles to the unit with screws.



5. Remove the four feet from the bottom side of the unit.

If the set is mounted in the rack without removing the feet, it will contact the lower unit, and upper unit cannot be pulled out from the rack.

6. Mount the Outer Rail Brackets of the guide rails to the rack, and adjust the position of the Brackets so that the distance from the edge of the Outer Rail to the outside of the rack meets the specified value.



NOTE: (1) When several units are mounted in a rack, it is recommended to install a fan for ventilation. Good air circulation is essential to prevent internal heat built-up in a rack (5°C to 40°C must be met for all units).

(2) Never remove the Lower Panel during rack mounting.

(3) Be sure to secure the rack to the floor to avoid accidents when the unit is pulled out.

#### **1-8. SUPPLIED ACCESSORIES**

Supplied accessories are as follows:

1. Remote Control Unit: RM-770
2. Battery (SUM-3) x 2
3. Remote Control Cable

The BVW-22P can remote control by using the remote control unit RM-770.

- . When the BVW-22P controls with wireless, use the batteries.
- . When the BVW-22P controls with wire, use the Remote Control Cable.

4. Top Cover

When rack mounting the BVW-22P, use this Top Cover.

5. Power Cord

#### **1-9. OPTIONAL ACCESSORIES**

The followings are provided as the optional accessories. Suitable accessories should be used for each system.

1. Rack Mount Kit (RMM-507)

The rack mount kit is used to mount the unit with the rack mount kit, RMM-507, in a standard 19-inch rack.

2. Cleaning Cassette Tape (BCT-5CLN)

Use the video and audio heads cleaning.



## SECTION 2 TECHNICAL INFORMATION

### 2-1. SPECIFICATIONS

#### GENERAL

Power requirements	: AC 220 to 240 V, 50 / 60 Hz
Operating Voltage	: AC 198 to 264 V
Power consumption	: 56 W
Operating temperature	: +5 C to +40 C
Storage temperature	: -20 C to +60 C
Humidity	: Less than 80 %
Weight	: 15.6 Kg
Dimensions	: 424 x 192 x 431 mm (w/h/d) including projection
Tape speed	: 101.5 mm/s
Playback time	: 100 minutes maximum (with a BCT-90ML cassette)
Fast forward/rewind time	: Less than 240 seconds (with a BCT-90ML cassette)
Search speed	: 3.5 times normal speed in forward and reverse directions.
Video cassette	: 1/2-inch, Betacam, and Betacam SP cassette for Beta format.
Metal particle tape	: BCT-5M/BCT-10M/BCT-20M/BCT-30M/BCT-60ML/ BCT-90ML or equivalent
Oxide tape	: BCT-5K/BCT-10K/BCT-20K/BCT-30K/BCT-60L/ BCT-90L or equivalent

# Video System

Luminance FM

Chrominance FM (Compressed time division multiplex)

		Metal particle tape	Oxide tape
Band width		25 Hz to 5.0 MHz +0.5 dB -6.0 dB	25 Hz to 4.0 MHz +0.5 dB -6.0 dB
S/N	Luminance	More than 47 dB	More than 46 dB
	Chrominance AM PM	More than 48 dB More than 48 dB	
K-factor (2 pulse)		Less than 3 %	
DG		Less than 3 %	
DP		Less than 3°	
Y/C delay		Less than 20 ns	

\* The specifications above are measured by playing back "Betacam SP" standard tapes.



## Audio System

CH-1/2 Bias recording

CH-3/4 FM recording

	Metal particle tape		Oxide tape
	CH-1/2 (LNG)	CH-3/4 (AFM)	CH-1/2 (LNG)
Frequency response (20 dB below peak level *1)	50 Hz to 15 kHz +3.0 dB, -4.0 dB	20 Hz to 20 kHz +0.5 dB, -2.5 dB	50 Hz to 15 kHz +3.0 dB, -4.0 dB
Signal to noise ratio (*2)	More than 62 dB	More than 68 dB	More than 58 dB
Distortion (at 1 kHz) at peak level (*1)	Less than 3 %		
at 0 VU level	Less than 2%	Less than 0.6%	Less than 2%
Wow and flutter (DIN 45507)	Less than 0.13%	_____	Less than 0.13 %

(\*1) Peak level - LNG: +8 VU, AFM: +19 VU

(\*2) Referred to peak level, weighted CCIR 468-3, with Audio N.R.

\* The specification above are measured by playing back "Betacam SP" standard tapes.

## OUTPUT

VIDEO OUTPUT : Composite video, 1.0 Vp-p, 75 ohms, sync negative

## AUDIO OUTPUT

CH-1/3, CH-2/4 : -10 dBs, 47 kohms, unbalanced

MONITOR : -5 dBs, 47 kohms, unbalanced

MONITOR : VIDEO : 1.0 Vp-p, 75 ohms, sync negative

AUDIO : -5 dBs, 47k ohms, unbalanced

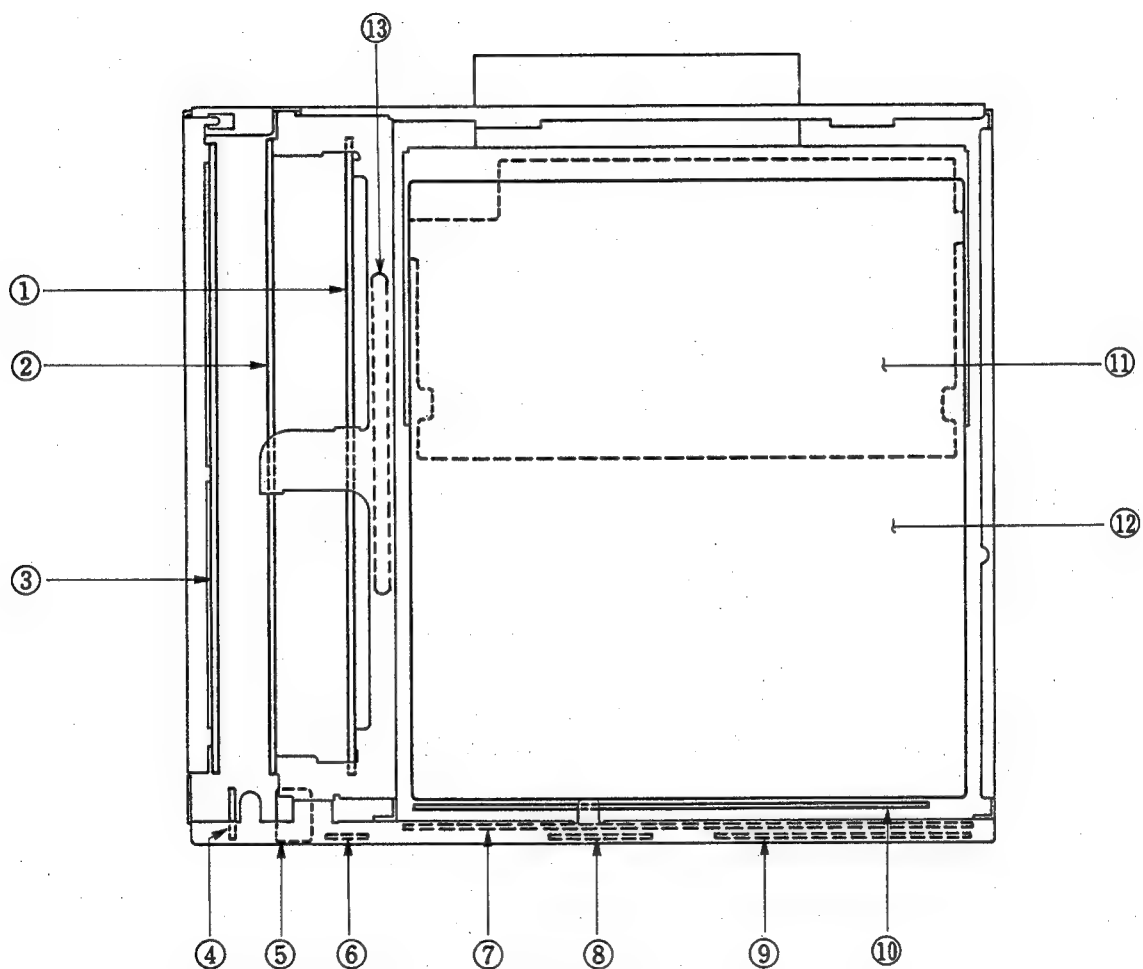
RF OUT : UHF channel 30 to 39 adjustable, system I/G selectable

HEADPHONES : -20 dBs to -48 dBs, 8 ohms

\* The video output signal level indicates a 100/7.5/77/7.5 color-bar signal.

## 2-2. LOCATION OF THE PRINTED CIRCUIT BOARDS

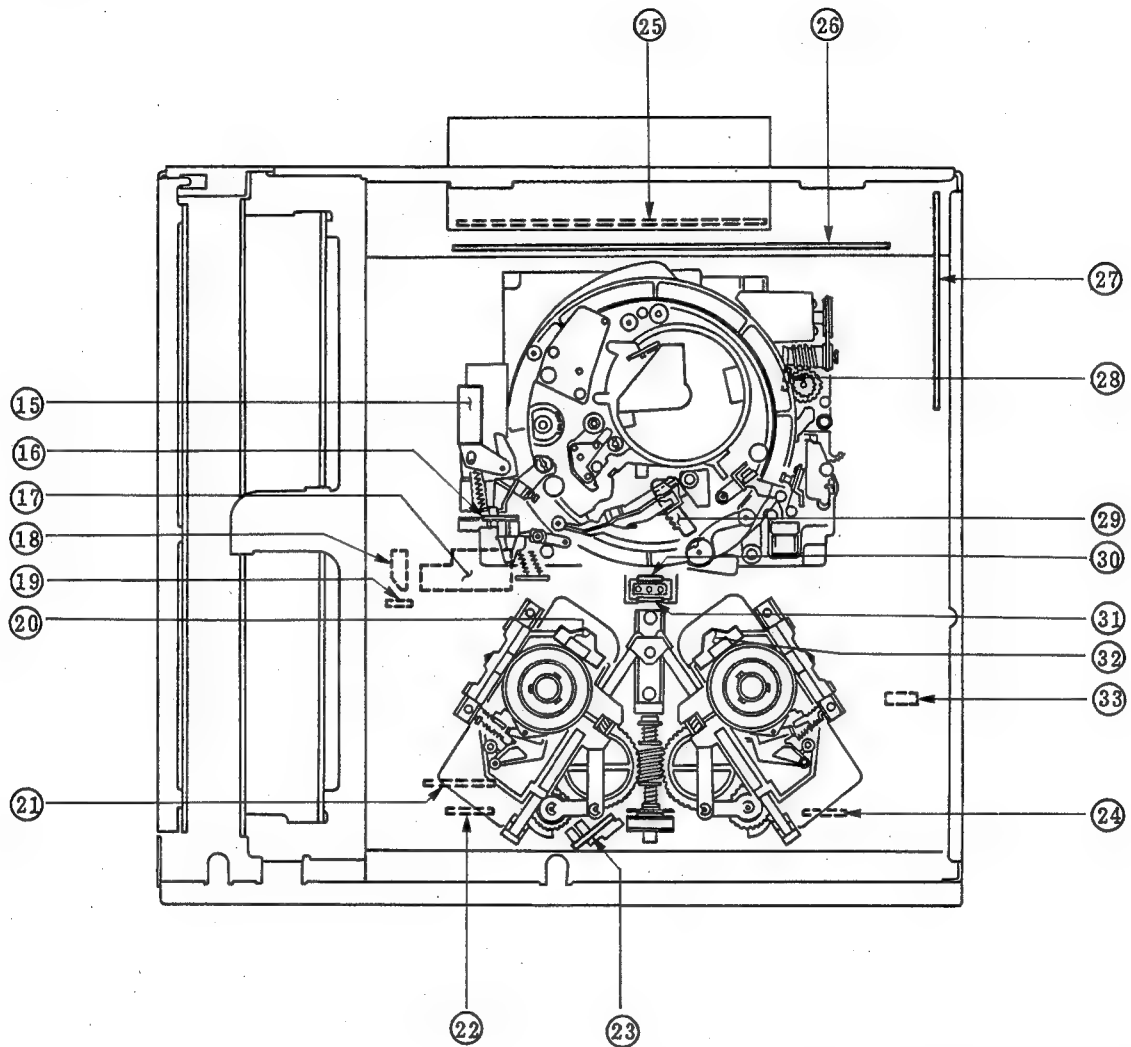
### TOP VIEW (1)



- ① SY-121A Board
- ② SV-99 Board
- ③ AU-101A Board
- ④ HP-38 Board
- ⑤ VR-69 Board
- ⑥ LED-58 Board

- ⑦ KY-130 Board
- ⑧ SW-274 Board
- ⑨ DP-87 Board
- ⑩ TC-49A Board
- ⑪ DM-74 Board
- ⑫ EN-66A Board
- ⑬ SV-117A Board

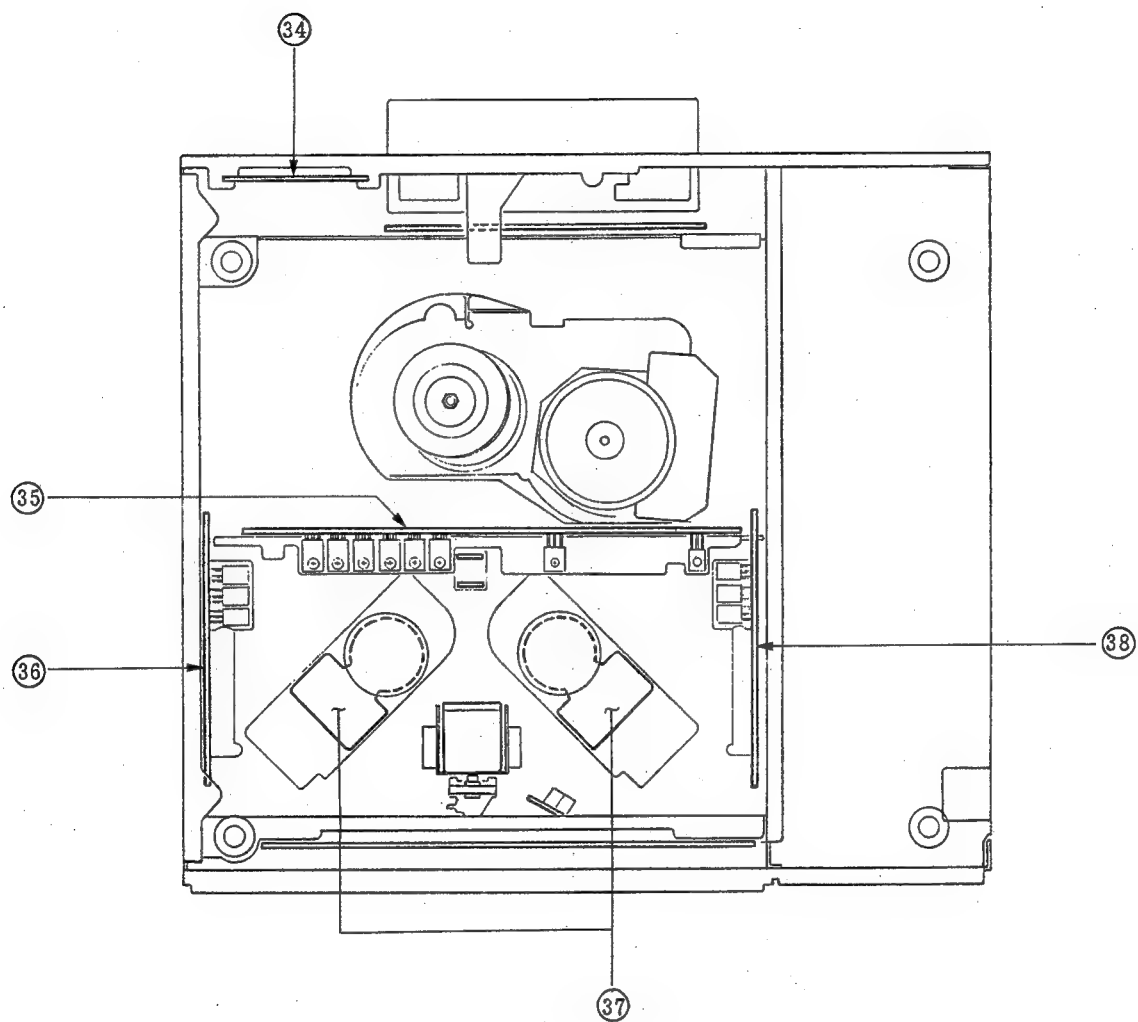
TOP VIEW (2)



- ①⑤ PD-35 Board
- ①⑥ PTC-15 Board
- ①⑦ CL-14 Board (Cassette-up Compartment)
- ①⑧ PC-33 Board (Cassette-up Compartment)
- ①⑨ PC-33 Board (Cassette-up Compartment)
- ②⑦ DE-15 Board
- ②① PC-47 Board (Cassette-up Compartment)
- ②② PC-41 Board (Cassette-up Compartment)
- ②③ PTC-21 Board

- ②④ PC-41 Board (Cassette-up Compartment)
- ②⑤ UR-14E
- ②⑥ DC-36 Board
- ②⑦ CP-123 Board
- ②⑧ PTC-31 Board
- ②⑨ TR-18 Board
- ③① PTC-20 Board
- ③② PTC-36 Board
- ③③ DE-15 Board
- ③④ CCM-2 Board (Cassette-up Compartment)

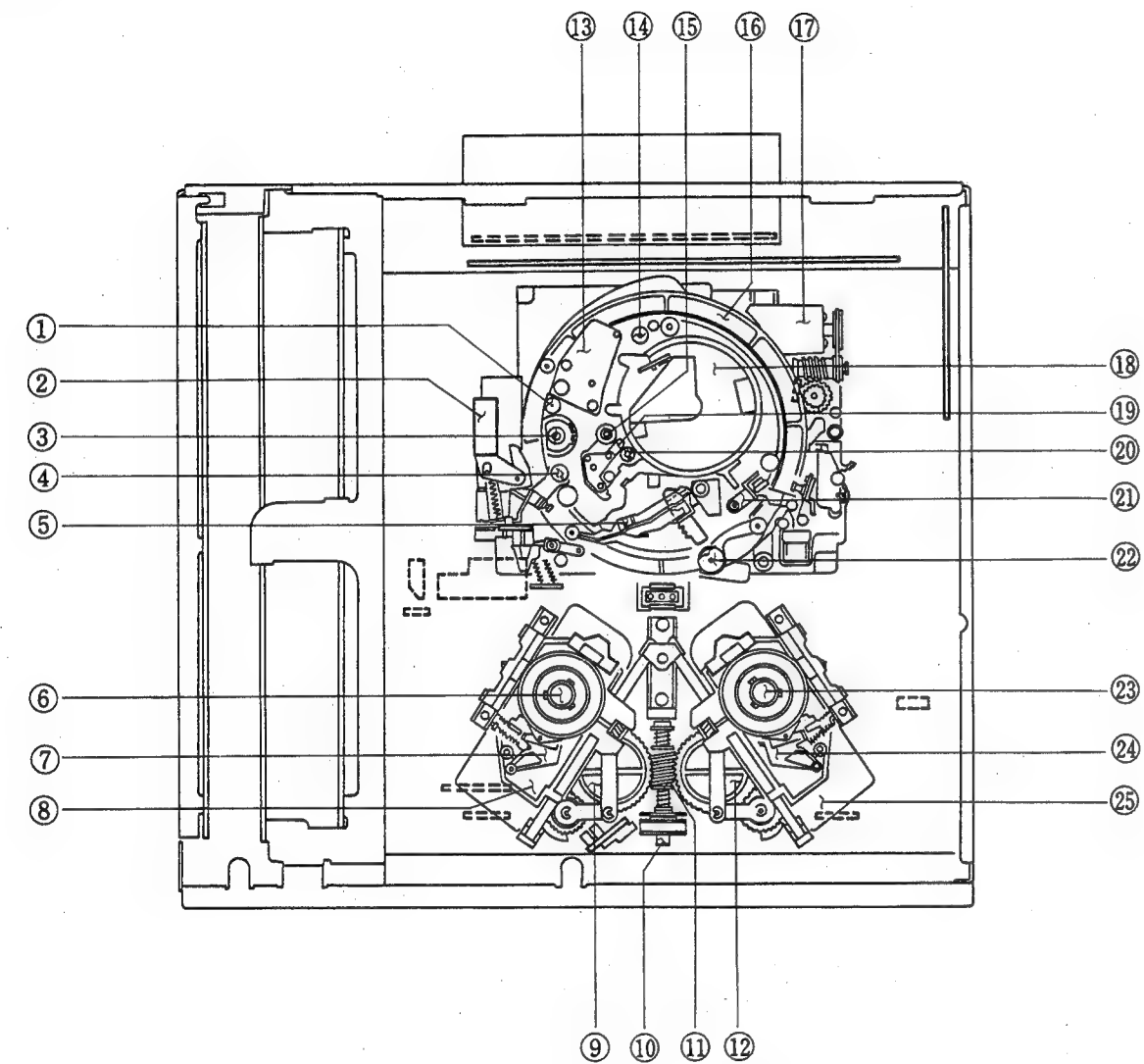
**BOTTOM VIEW**



- ③④ AC-93A Board
- ③⑤ SVD-2 Board
- ③⑥ DUS-175 Board
- ③⑦ RM-40 Board
- ③⑧ DUS-174 Board

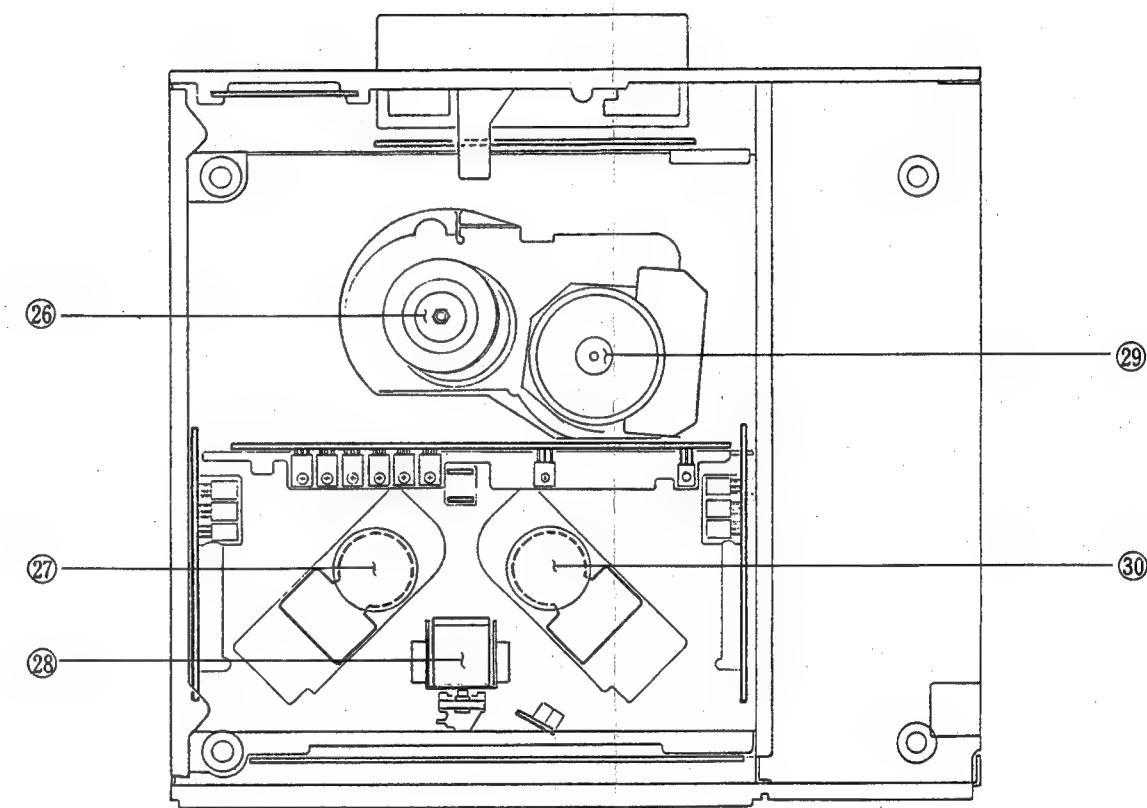
2-3. LOCATION OF THE MAIN MECHANICAL PARTS/COMPONENTS

TOP VIEW



- |                       |                       |
|-----------------------|-----------------------|
| ① TG-4                | ⑭ TG-3                |
| ② Pinch Solenoid      | ⑮ TG-1                |
| ③ Capstan Shaft       | ⑯ Threading Ring      |
| ④ TG-0                | ⑰ Gear Box            |
| ⑤ S Tension Regulator | ⑱ Head Drum           |
| ⑥ Supply Reel Table   | ⑲ CTL Head            |
| ⑦ Supply Brake Ass'y  | ⑳ TG-2                |
| ⑧ Supply Motor Plate  | ㉑ T Drawer Arm        |
| ⑨ Supply Worm Wheel   | ㉒ Pinch Roller        |
| ⑩ Timing Pulley       | ㉓ Take-up Reel Table  |
| ⑪ Worm Gear           | ㉔ Take-up Brake Ass'y |
| ⑫ Take-up Worm Wheel  | ㉕ Take-up Motor Plate |
| ⑬ Audio/TC Head Block |                       |

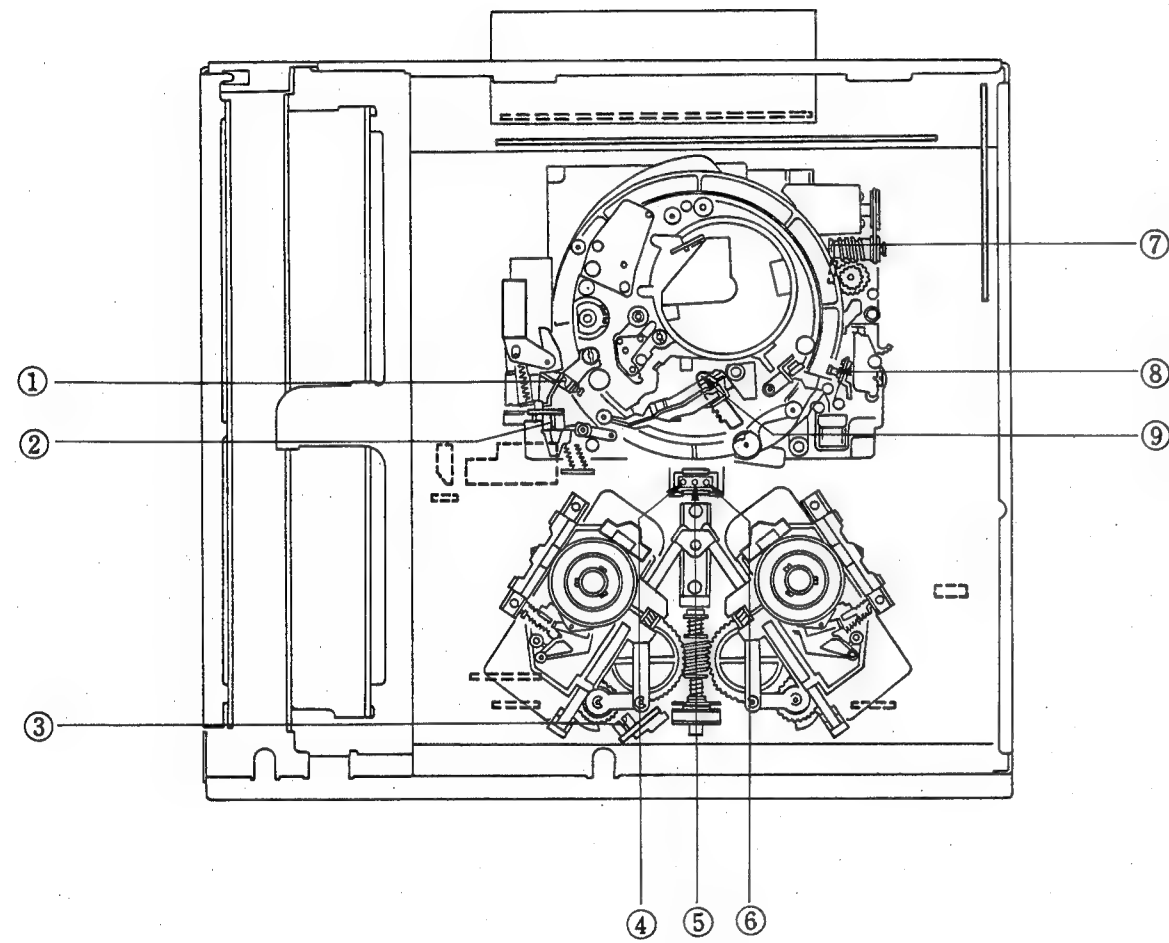
BOTTOM VIEW



- |                        |
|------------------------|
| ②⑥ Drum                |
| ②⑦ Take-up Reel Motor  |
| ②⑧ Reel Transfer Motor |
| ②⑨ Capstan Motor       |
| ③⑩ Supply Reel Motor   |

2-4. LOCATION OF THE SENSORS

TOP VIEW

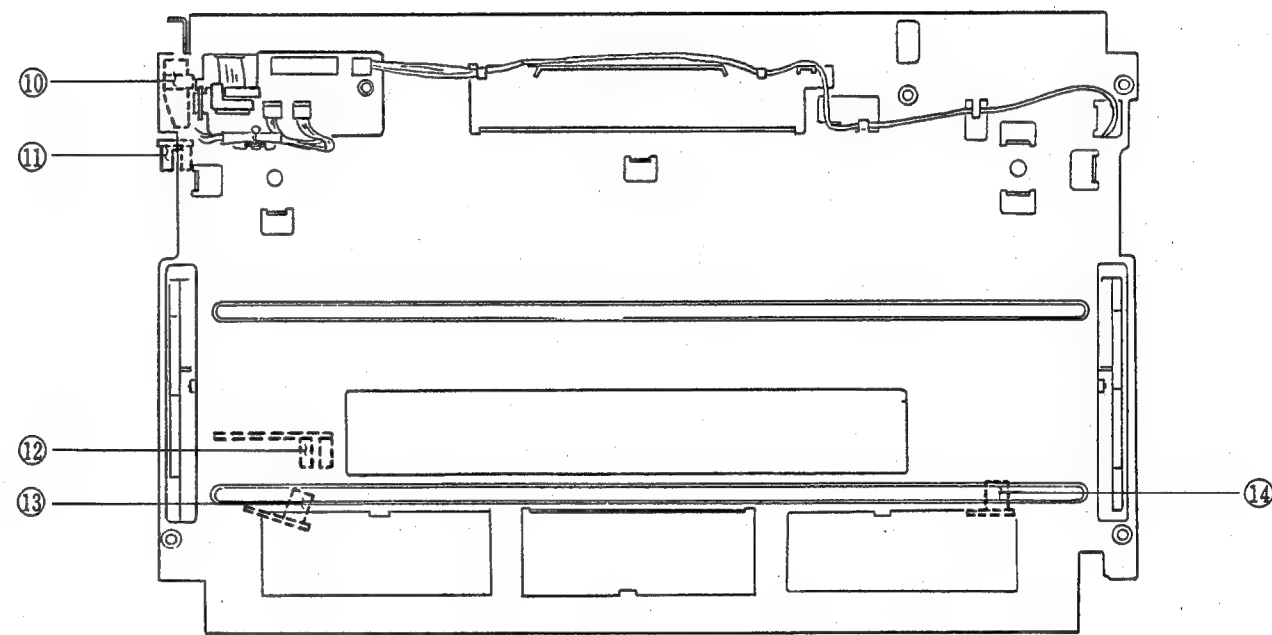


- ① Tape End Sensor
- ② Ring Sensor
- ③ Reel Table L/S Position Detection Sensor
- ④ Reel Hub Diameter Detection Switch
- ⑤ Oxide/Metal Particle Tape Detection Switch

- ⑥ Video Tape Thickness Detection Switch
- ⑦ Threading Speed Detection Sensor
- ⑧ Tape Beginning Sensor
- ⑨ Tape Tension Sensor

\* The "S cassette" or "small cassette" described in the Maintenance Manual indicates a standard cassette.

TOP VIEW OF THE CASSETTE-UP COMPARTMENT



- ⑩ Cassette-down Switch (2)
- ⑪ Cassette-down Switch (1)
- ⑫ Cassette L/S Size Detection Switch
- ⑬ Cassette-in Switch (L)
- ⑭ Cassette-in Switch (R)

## 2-5. FUNCTIONS OF THE SENSORS AND CASSETTE TAB

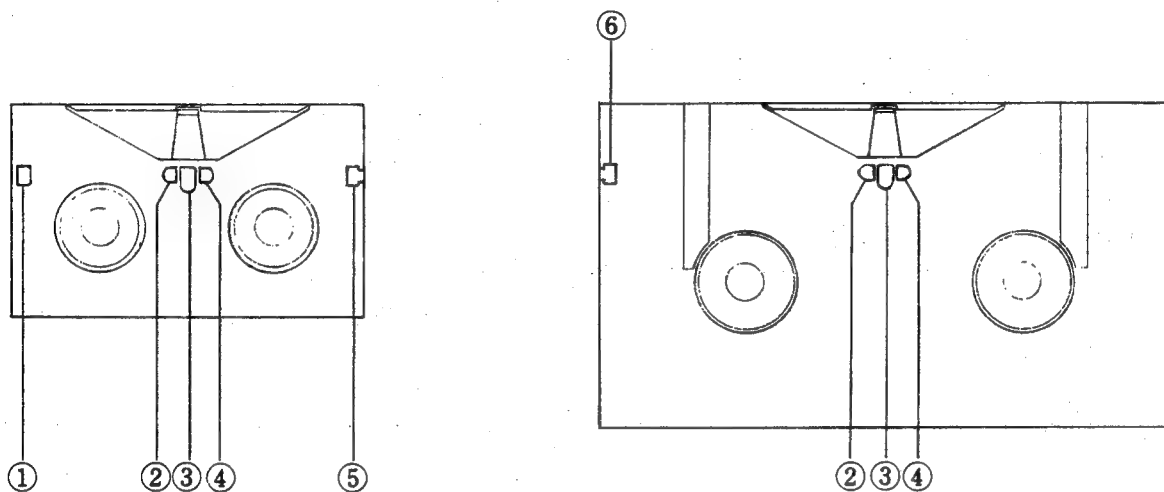
### 2-5-1. Function of the Sensors

1. Reel Table L/S Position Detection Sensor  
(Sec. 2-4- (3) )
  - . The sensor detects whether the Reel Table moves to the correct position according to the size of the inserted cassette.
2. Ring Sensor  
(Sec. 2-4 (2) )
  - . The sensor detects whether the Threading Ring reaches the THREAD END or UNTHREAD END position.
3. Tape Tension Sensor  
(Sec. 2-4- (9) )
  - . During playback, a tension arm is activated to keep a constant tape tension at the drum entrance. The Tape Tension Sensor detects the position of the tension arm.
4. Threading Speed Detection Sensor  
(Sec. 2-4- (7) )
  - . During threading, the Threading Ring rotation speed is controlled using a servo circuit to protect the tape from damage. The Threading Ring rotation speed is detected using the Threading Speed Detection Sensor installed into the Gear Box Block.
5. Reel Hub Diameter Detection Switch  
(Sec. 2-4- (4) )
  - . The reel hub diameter varies depending on the length of the tape wound on a cassette. The diameter is detected using the Reel Hub Diameter Detection Switch. The resultant data is sent to the servo circuit.
6. Oxide/Metal Particle Tape Detection Switch  
(Sec. 2-4- (5) )
  - . This switch detects whether an oxide tape or a metal particle tape is being used.
7. Video Tape Thickness Detection Switch  
(Sec. 2-5- (6) )
  - . This switch detects the thickness of the video tape wound on a cassette.

8. Cassette L/S Size Detection Switch  
(Sec. 2-4- (12) )
  - . This switch detects whether the inserted cassette is large or small.
9. Cassette-in Switch (L)/Cassette-in Switch (R)  
(Sec. 2-4- (13) , (14) )
  - . This switch detects whether a cassette is being inserted.
10. Cassette-down Switch (1)  
(Sec. 2-4- (11) )
  - . This switch detects whether a cassette is inserted and the stage of the Cassette-up Compartment goes down.
  - . It detects whether the stage of the Cassette-up Compartment goes up in the EJECT mode.
11. Cassette-down Switch (2)  
(Sec. 2-4- (10) )
  - . This switch checks whether the stage of the Cassette-up Compartment moves to the correct position.

## 2-5-2. Function of the Cassette Plug and Tab

As shown in the figure below, plugs and tabs are provided at the back of the video cassette.



- \* ① Small cassette's miss-REC (for Oxide tape)
- ② Video tape thickness detection
- ③ Oxide/Metal tape detection
- ④ Reel hub diameter detection
- \* ⑤ Small cassette's miss-REC (for Metal tape)
- \* ⑥ Large cassette's miss-REC

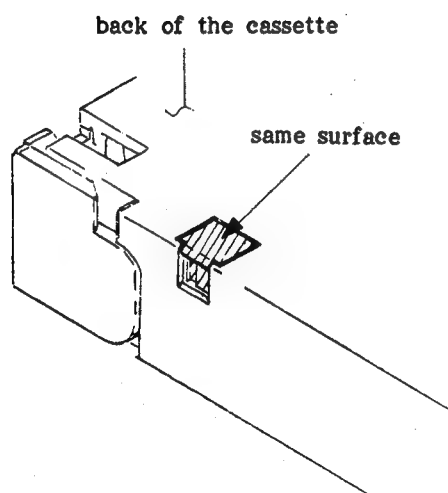


Fig. 1

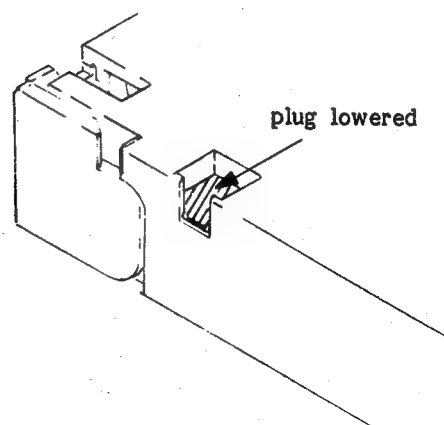


Fig. 2



The presence or absence of these plugs and tabs determines the cassette status as shown in the table below.

Plug and tab	Cassette status with plugs and tabs	Cassette status without plugs and tabs
(*) Small cassette miss-REC (for oxide tape)	Can be recorded.	Cannot be recorded. . When recording is required, cover the former location of the tab with vinyl tape.
(*) Small cassette miss-REC (for metal particle tape)	Can be recorded (the plug is located on the same surface as the back of the cassette) (refer to Fig. 1).	Cannot be recorded (the plug is lower than the back of the cassette) (refer to Fig. 2). . When recording is required, raise the plug.
(*) Large cassette miss-REC	Can be recorded (the plug is located on the same surface as the back of the cassette) (refer to Fig. 1).	Cannot be recorded (the plug is lower than the back of the cassette) (refer to Fig. 2). . When recording is required, raise the plug.
Tape thickness	A 20um thick tape is wound on the cassette.	A 15um thick tape is wound on the cassette.
Oxide/Metal tape detection	An oxide tape is wound on the cassette.	A metal particle tape is wound on the cassette.
Reel hub diameter	For small hub	For large hub

(NOTE) \* marked items are not function in BVW-22P.

## 2-6. PRINTED CIRCUIT BOARDS

The circuit information is provided below.

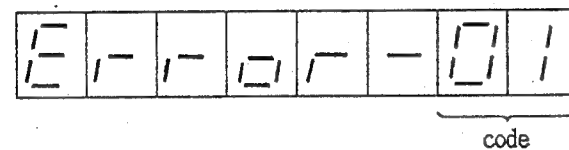
SYSTEM	BOARD	CIRCUIT FUNCTION
VIDEO	DM-74	Video Demodulator
	EN-66A	Video Encoder
	CP-123	Video Output Amplifier
AUDIO	AU-101A	Audio PB Amplifier
	HP-38	Headphones Volume/Jack
SERVO	SV-99	Drum/Capstan/Reel Servo
	SV-117A	Picture Splitting Compensator
	SVD-2	Drum/Capstan Motor Driver
	DE-15	Reel FG
	DUS-174	Reel Motor Driver
	DUS-175	Reel Motor Driver
	TR-18	Tape Tension Sensor
	VR-69	Tracking Control Volume
SYSTEM CONTROL	KY-130	Function Key/Display
	DP-87	Time Counter Display
	SW-274	Dolby NR/Superimpose Switch
	LED-58	Auto Off Display
	SY-121A	System Control
	CCM-2	Cassette-up Compartment Motor
	CL-14	Cassette-up Compartment
	PC-47	Cassette-up Compartment (L/S Detector)
	PC-33	Cassette-up Compartment (Cassette UP/Down Detector)
	PC-41	Cassette-up Compartment (Cassette IN Detector)
	PD-35	Pinch Solenoid
	PTC-15	Thread/Unthread End Sensor
	PTC-20	Cassette Detector (Tape Thickness, Reel Hub Diameter, Metal/Oxide)
	PTC-21	Reel Table Position Detector
	PTC-31	Threading Motor FG Detector
	PTC-36	Cassette Detector (Tape Thickness, Reel Hub Diameter, Metal/Oxide)
	RM-40	Relay Board for Reel Motor & Brake Solenoid
TIME CODE	TC-49A	Time Code Reader
POWER	UR-14E	Switching Regulator
	AC-93A	AC Input
	DC-36	DC Supply

## 2-7. SELF DIAGNOSIS FUNCTION

BW-22P has a self diagnosis function to the troubles during operation.

When the troubles are detected, an error code is displayed on the Time Counter/Hours Meter display.

( Time Counter/Hours Meter display )

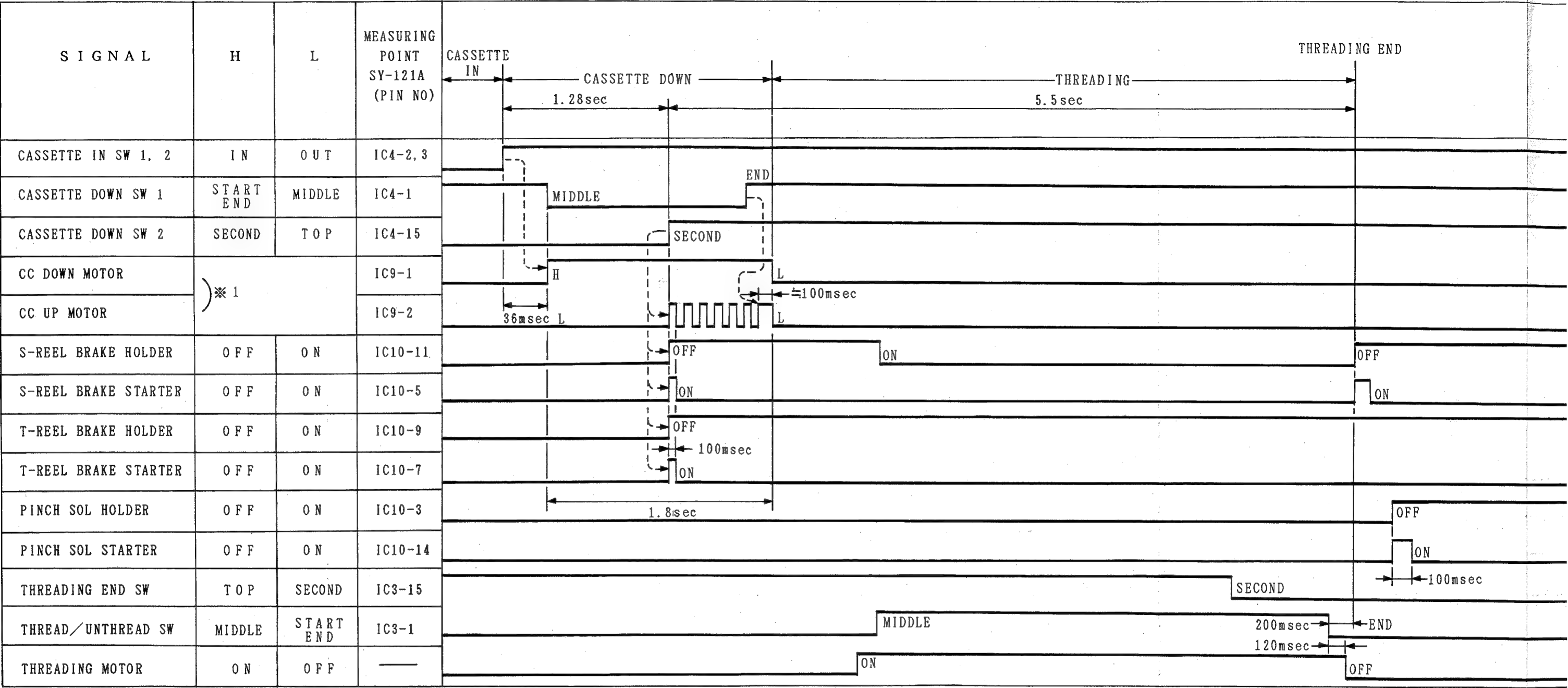


Code	Description	Detection	Tape Protection	AUTO OFF Lamp	Enable Operation	Possible Cause
01	When tape slacking is detected during unthreading, tape protection is done and this code is displayed.	Detected when the ratio of the FG frequency at a take-up reel and threading ring is less than the specified value.	Threading ring rotation is stopped.	Lighting	Power switch off only	1. Defective the FG of a take-up reel. 2. Defective the reel driving system. 3. Tape is not taken up because of mechanical defective.
02	When tape slacking is detected in SEARCH, F.FWD or REW mode, tape protection is done and this code is displayed.	Detected when the ratio of the FG frequency at a supply and take-up reels is less than the specified value.	STOP → STANDBY OFF mode	Lighting	Power switch off only	1. Defective the FG of a supply and take-up reels. 2. Defective the reel driving system. 3. Increase the friction of reel driving system and tape running system. 4. NV-RAM error
03	When tape slacking is detected in PLAY mode, tape protection is done and this code is displayed.	Detected when the ratio of the FG frequency at a capstan motor and take-up reel motor is less than the specified value or when the tension detected from a tension sensor is less than 15g.	STOP → STANDBY OFF mode	Lighting	Power switch off only	1. Defective the FG of a take-up reel. 2. Defective the reel driving system.
04	When the tape does not run at the designated speed in F.FWD or REW mode, tape protection is done and this code is displayed.	Detected when the tape speed using the FG frequency at supply and take-up reels is compared with the designated speed in F.FWD and REW modes.	STOP → STANDBY OFF mode	Lighting	Power switch off only	1. Increase the friction of reel driving system and tape running system. 2. Reel table does not rotate because of mechanical system defective.
05	Displayed when the supply and take-up reels rotate without installing cassette.	Detected using the FG frequency at supply and take-up reels.	Cassette cannot be inserted.	Lighting	Power switch off only	Defective the reel driving system.
06	Displayed when excessive tension is detected in PLAY, SEARCH or STOP mode.	Detected when the tension detected from a tension sensor is more than 55g.	————	Lighting	Except for PLAY, SEARCH and STOP	1. Defective the reel driving system. 2. Increase the friction of reel driving system and tape running system. 3. Defective the tension sensor system.
07	Displayed when the tape does not run at the designated speed in PLAY mode.	Detected at the tape speed that is detected from the FG frequency of a capstan motor.	————	Lighting	Except for PLAY	1. Defective the capstan driving system. 2. Defective the FG of a capstan.
08	When drum motor rotation is abnormal, tape protection is done and this code is displayed.	Detected when the drum speed obtained from the drum motor's speed PG is less than or more than the specified value.	(In STOP, PLAY, SEARCH, F.FWD and REW mode) STOP → STANDBY OFF mode (In unthreading and threading modes) Threading ring rotation is stopped.	Lighting	EJECT	1. Drum motor free running. 2. Defective the drum driving system. 3. Tape is stuck to drum.

Code	Description	Detection	Tape Protection	AUTO OFF Lamp	Enable Operation	Possible Cause
09	When threading or unthreading is not completed, tape protection is done and this code is displayed.	Detected when threading or unthreading is not completed within about ten seconds after it is started.	The threading ring rotation is stopped.	Lighting	EJECT	1. Threading ring does not rotate because of mechanical defective. 2. Defective the Ring Sensor system. 3. Defective the threading motor driving system.
0A	When threading cannot be done, tape protection is done and this code is displayed.	Detected when the FG frequency at a take-up reel cannot be detected during threading or the tape beginning sensor is activated after the short FF mode is automatically entered two times.	The threading ring rotation is stopped.	Lighting	EJECT	1. Threading ring does not rotate because of mechanical defective. 2. Defective the Ring Sensor system. 3. Defective the threading motor driving system. 4. Defective the FG of a take-up reel. 5. Defective the Tape Beginning Sensor system.
10	Displayed when condensation is detected.	Detected using a condensation sensor.	Cassette out	Lighting	EJECT	Condensation
12	Displayed when the Tape Beginning Sensor operation is defective.	Detected when the Tape Beginning Sensor detected the tape beginning at the video tape portion except tape beginning.	(In REVERSE or REW mode) STOP → STANDBY OFF mode	Lighting	Except for REVERSE, REW.	Defective the Tape Beginning Sensor system.
			(In threading mode) The threading ring rotation is stopped.		Power switch off only	
13	Displayed when the Tape End Sensor operation is defective in FORWARD search, PLAY or F.FWD mode.	Detected when the Tape End Sensor detected the tape end at the video tape portion except tape end.	STOP → STANDBY OFF mode	Lighting	Except for FORWARD, PLAY and F.FWD.	Defective the Tape End Sensor system.
20	When cassette up/down operation is not completed, tape protection is done and this code is displayed.	Detected when cassette up/down operation is not completed within about four seconds after it is started.	(In cassette-up mode) Stop the cassette-up operation.	—	Power switch off only	1. The Cassette-up Compartment does not up or down because of mechanical defective. 2. Defective the Cassette-up Compartment motor driving system. 3. Defective the Reel Table L/S Position Detection Sensor system.
			(In cassette-down mode) Stop the cassette-down operation.		EJECT	
21	When moving from L to S or S to L of the reel table is not completed in the cassette-down state, tape protection is done and this code is displayed.	Detected when reel table moving is not completed within about four seconds after it is started.	Cassette out	—	Inseart a cassette	1. Reel Table does not rotate because of mechanical defective. 2. Defective the Cassette-up Compartment motor driving system. 3. Defective the Reel Table L/S Position Detection Sensor system.
22	Displayed when Reel Table's L/S Position Detection Sensor operation is defective in the cassette-down state.	Detected when the "L" and "S" position are detected at the same time.	Stop the operation Cassette-up Compartment.	—	Inseart a cassette	Defective the Reel Table L/S Position Detection Sensor system.
23	Displayed when defects the threading ring's position sensor.	Detected when defects the Ring Sensor.	—	—	EJECT	1. Defective the Ring Sensor system. 2. Defective the Gear Box system.
91	Displayed when communication between SY-121A Board and KY-130 Board is defective.	Detected when communication signals between SY-121A Board and KY-130 Board are not be transfered and received.	—	—	—	1. Breaking of communication wire. 2. Defective KY-130 Board. 3. Detective the communication of SY-121A Board.
92	Displayed when communication between SY-121A Board and SV-99 Board is defective.	Detected when communication signals between SY-121A Board and SV-99 Board are not be transfered and received.	—	—	—	1. Breaking of communication wire. 2. Detective SV-99 Board. 3. Detective the communication of SY-121A Board.

2-8. TIMING CHART

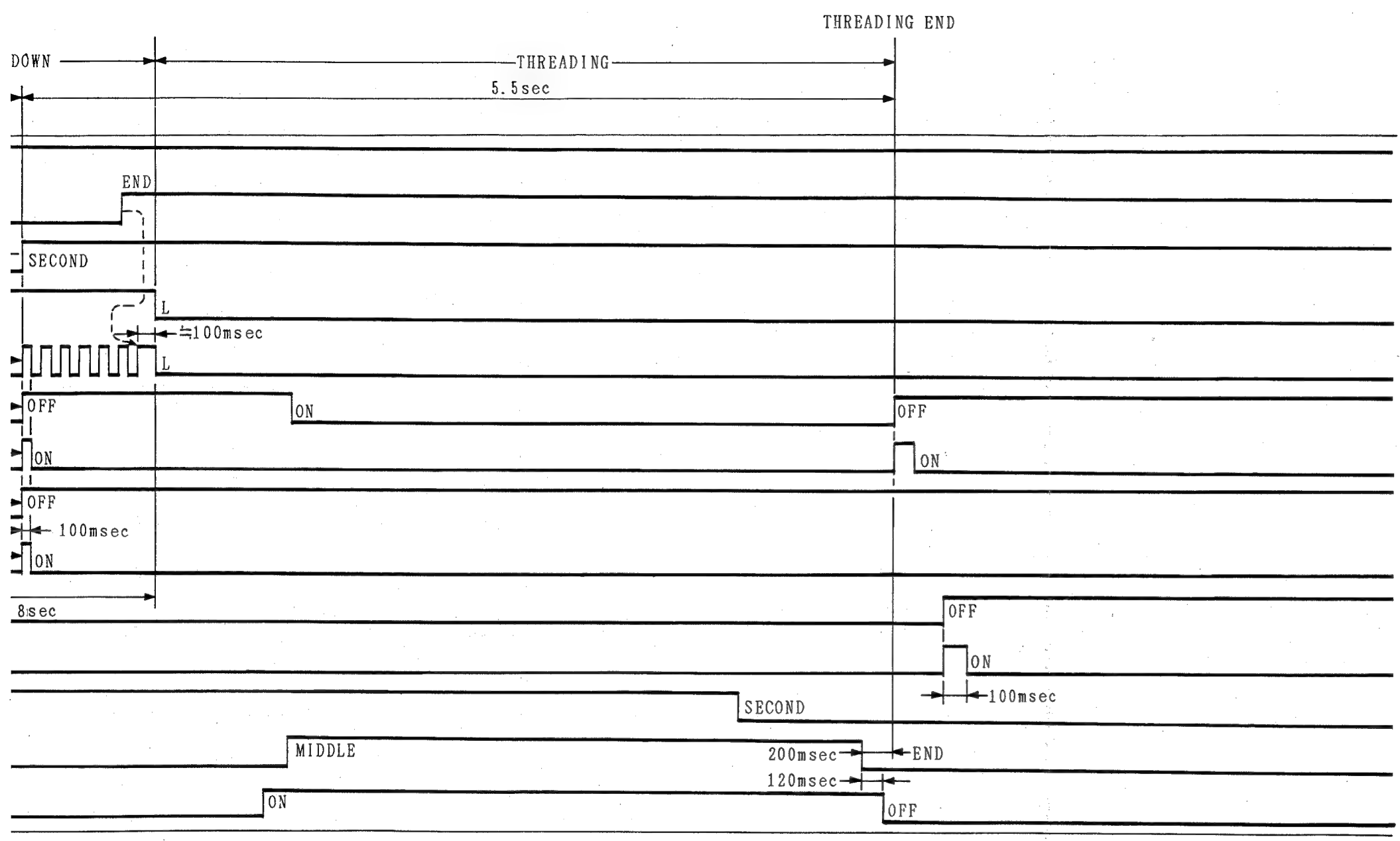
1. CASSETTE IN → CASSETTE DOWN → THREADING (SMALL)



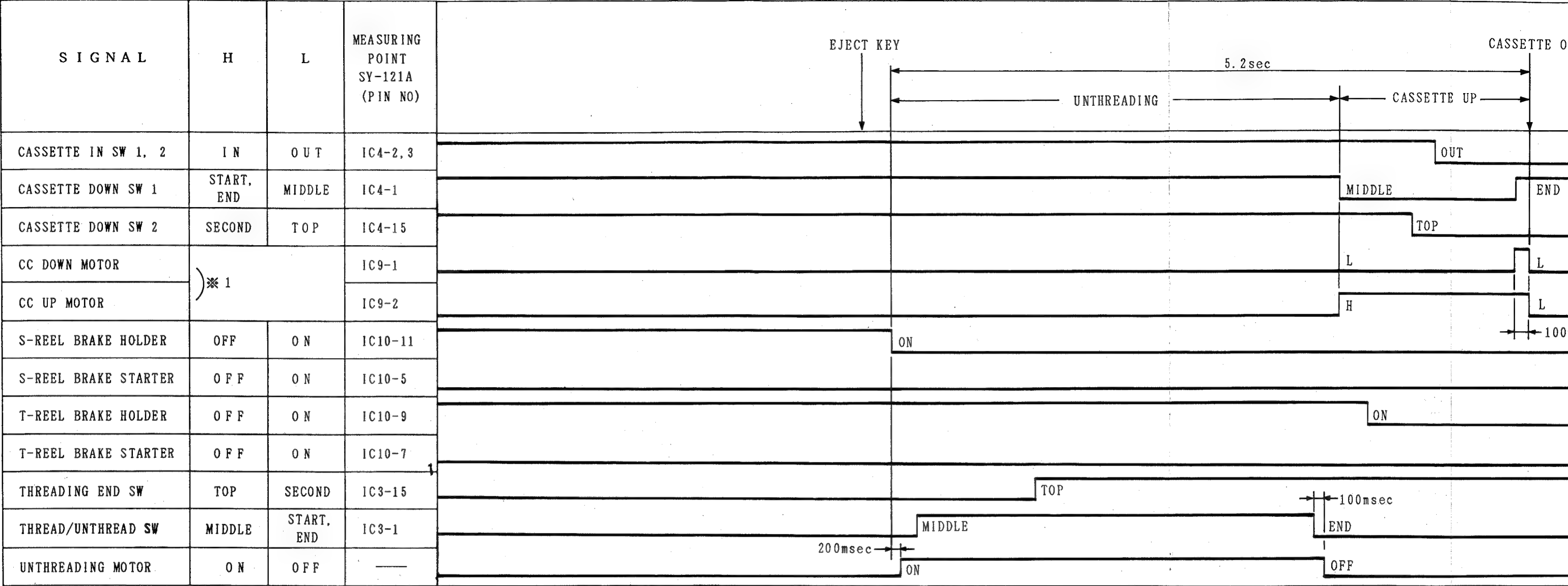
NOTE :

※1 CC DOWN MOTOR/CC UP MOTOR

CC DOWN MOTOR	CC UP MOTOR	OPERATION
H	H	BRAKE
H	L	CASSETTE DOWN
L	H	CASSETTE UP
L	L	STOP



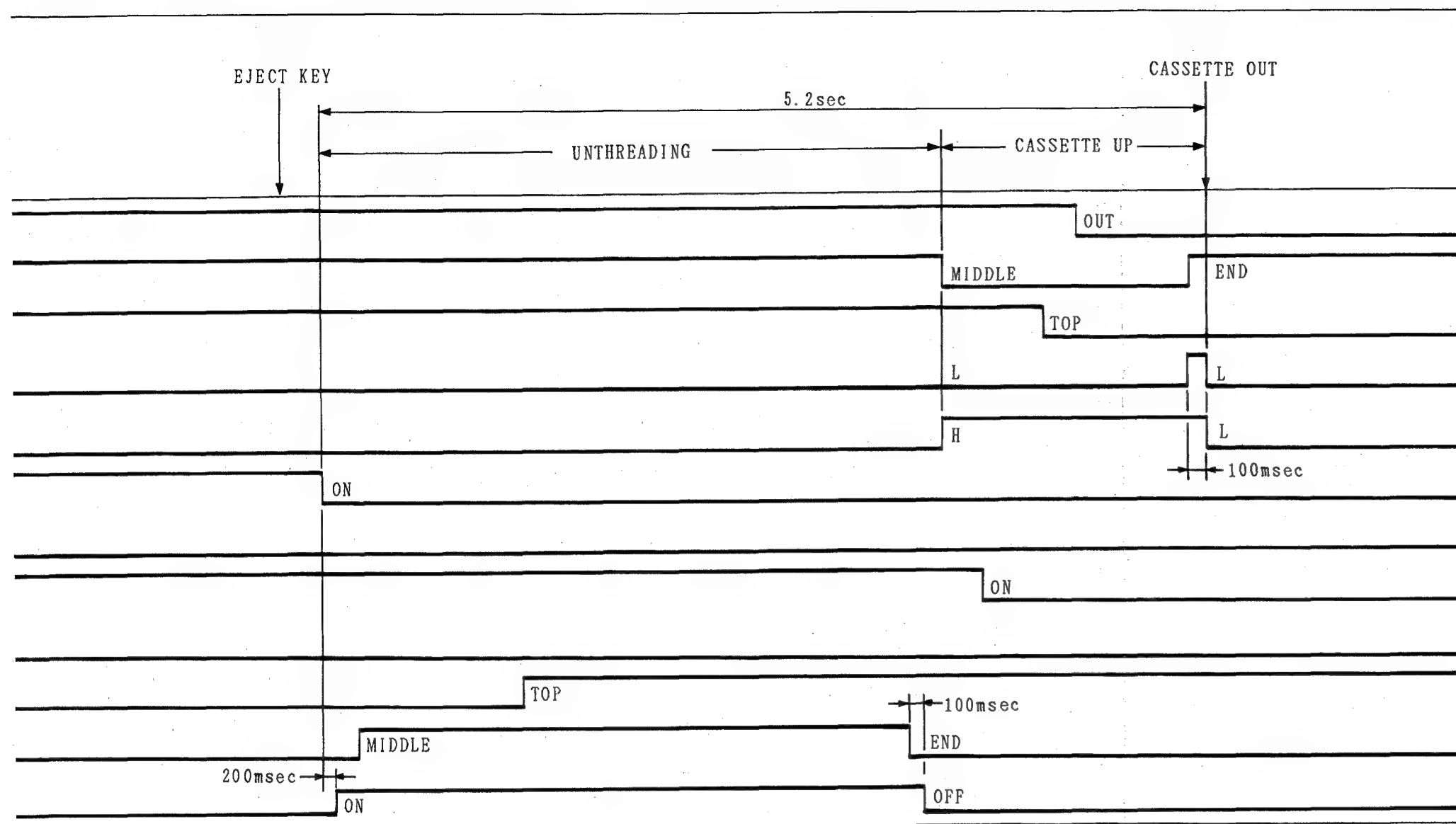
2.EJECT (UNTHREADING) → CASSETTE OUT (SMALL)



NOTE :

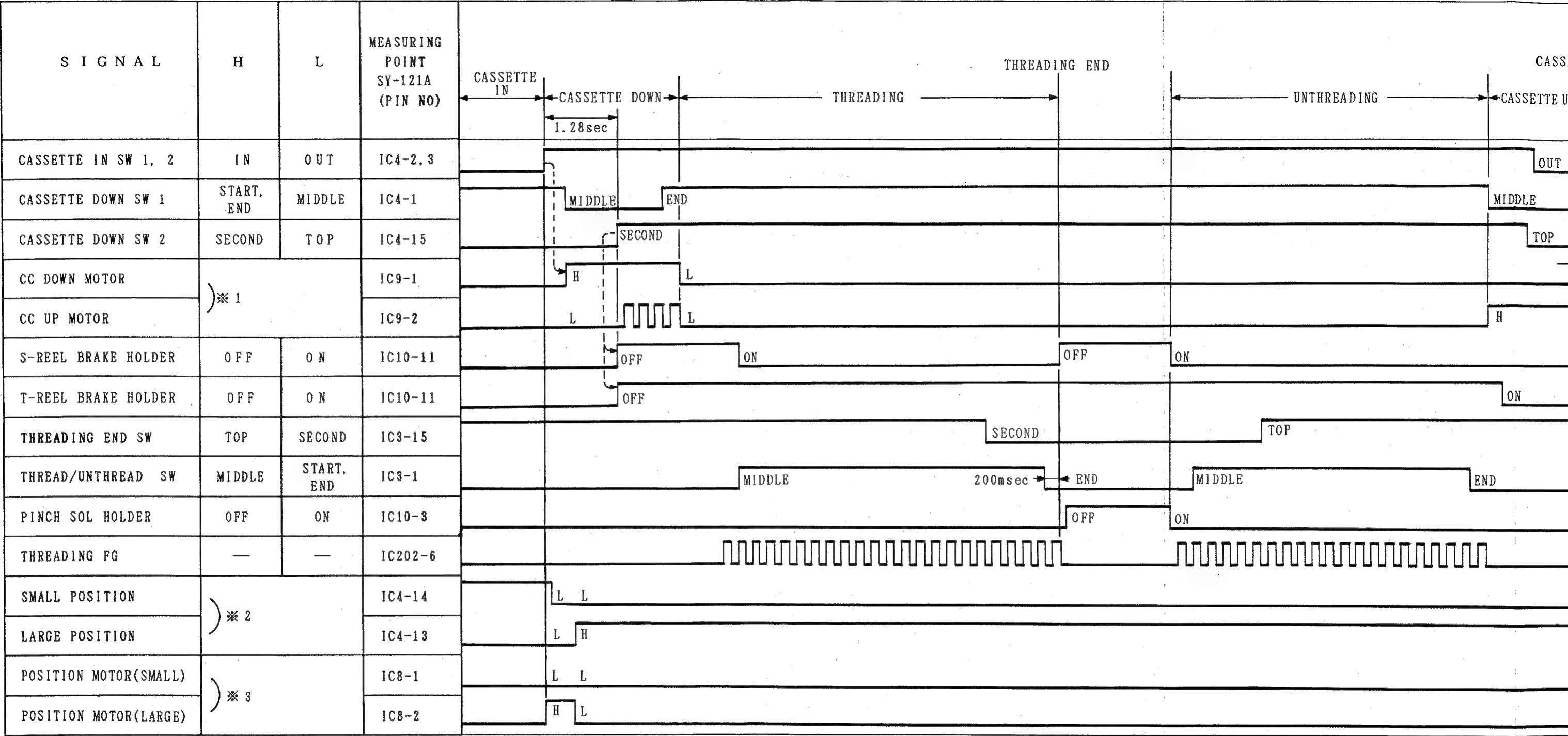
※1 CC DOWN MOTOR/CC UP MOTOR

CC DOWN MOTOR	CC UP MOTOR	OPERATION
H	H	BRAKE
H	L	CASSETTE DOWN
L	H	CASSETTE UP
L	L	STOP





3. CASSETTE IN → THREADING END → CASSETTE OUT (STAGE SMALL → LARGE)

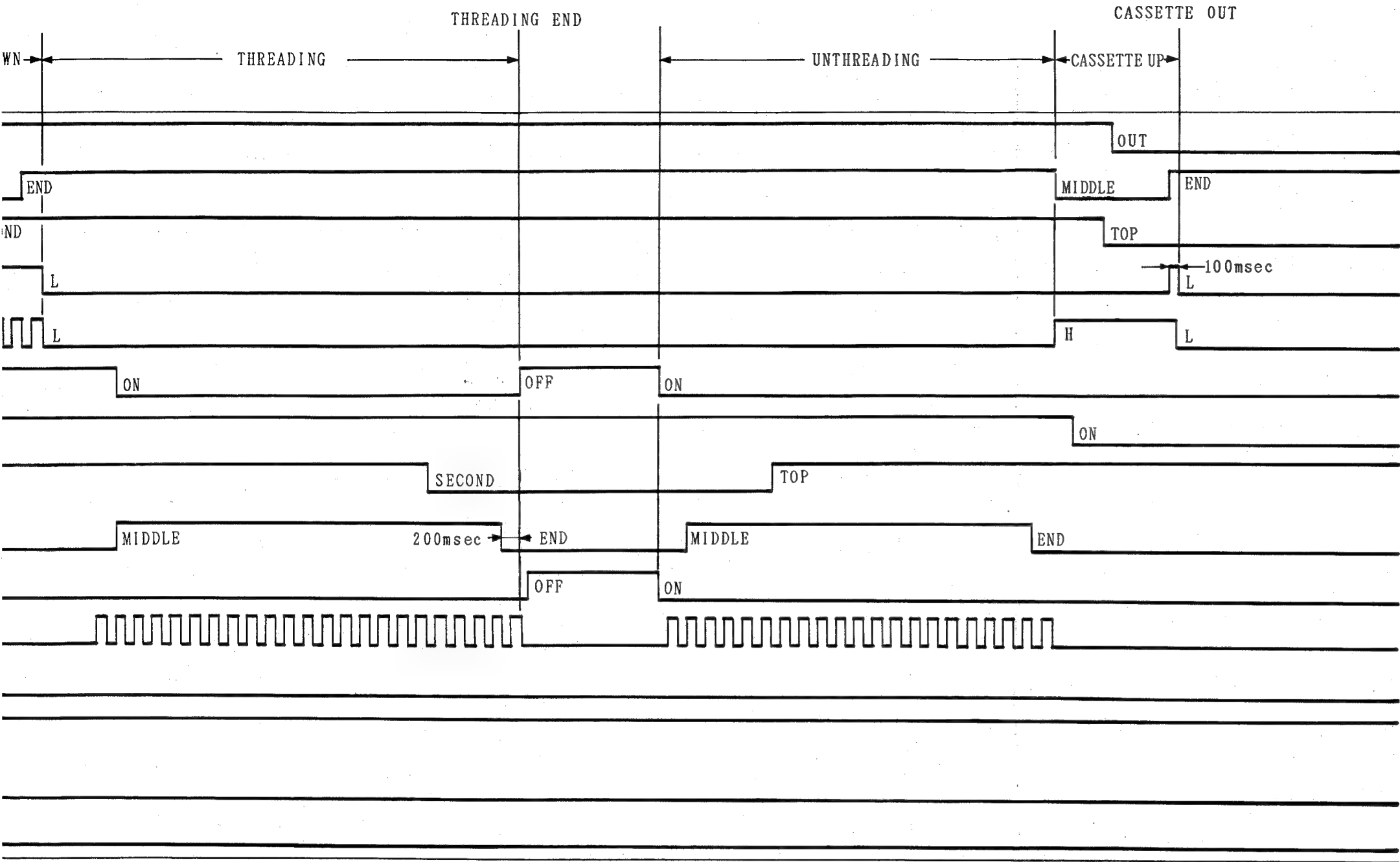


NOTE :

※1 CC DOWN MOTOR/CC UP MOTOR		
CC DOWN MOTOR	CC UP MOTOR	OPERATION
H	H	BRAKE
H	L	CASSETTE DOWN
L	H	CASSETTE UP
L	L	STOP

※2 SMALL POSITION/LARGE POSITION		
SMALL POSITION	LARGE POSITION	OPERATION
H	H	ILLEGAL
H	L	SMALL
L	H	LARGE
L	L	MIDDLE

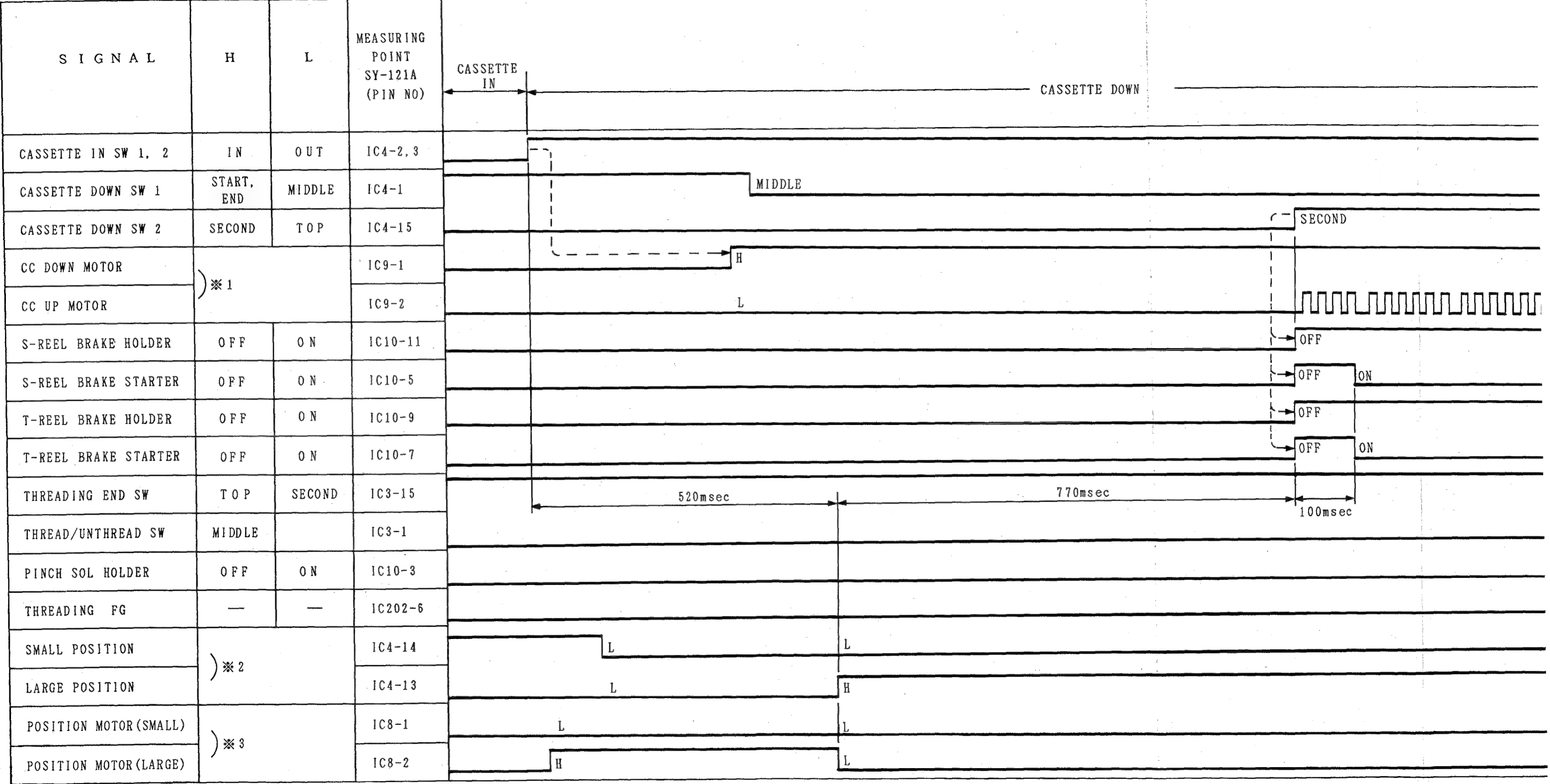
※3 POSITION MOTOR(SMALL)/POSITION MOTOR(LARGE)		
POSITION MOTOR (SMALL)	POSITION MOTOR (LARGE)	OPERATION
H	H	BRAKE
H	L	SMALL
L	H	LARGE
L	L	STOP

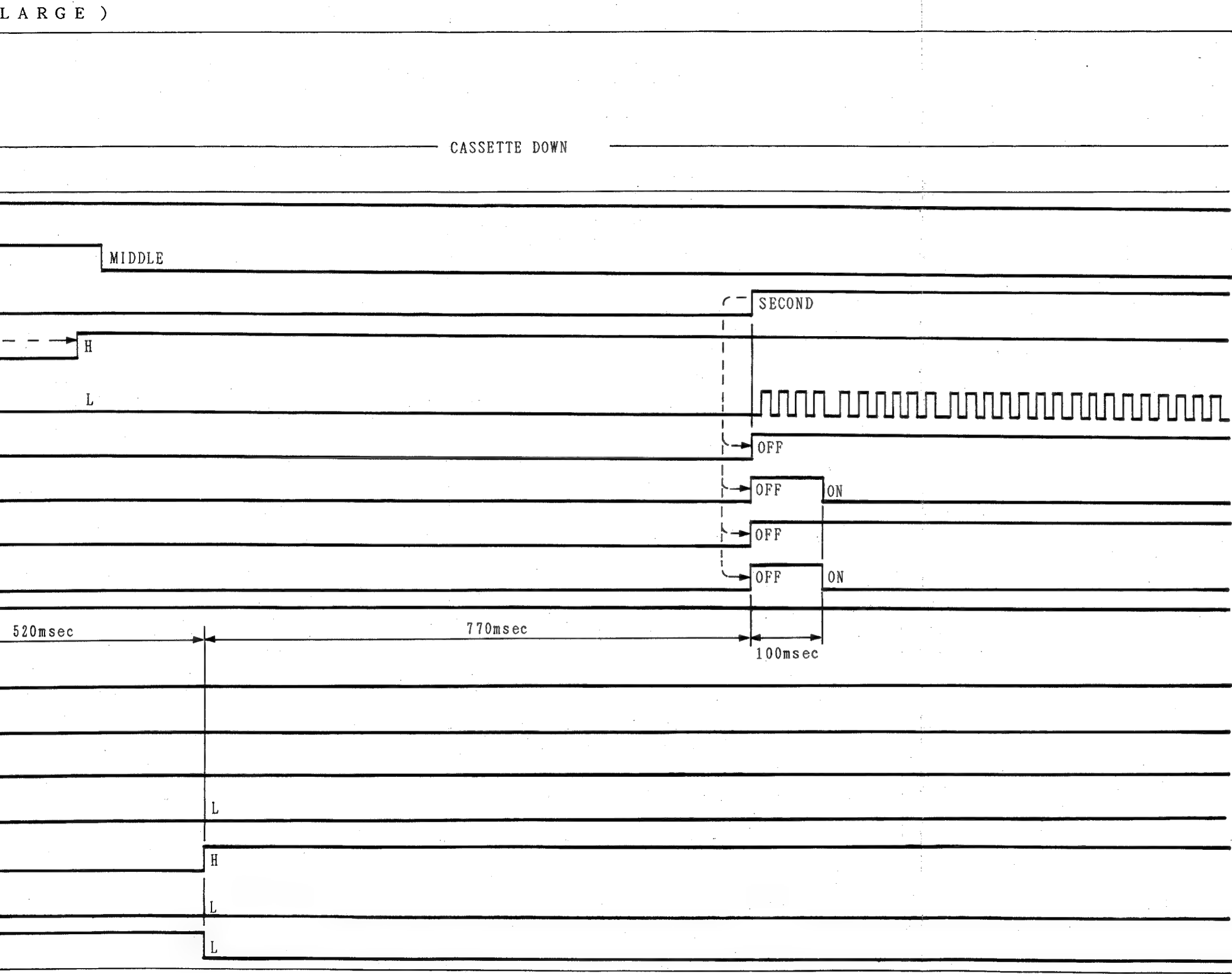


ITION	
ION	OPERATION
	ILLEGAL
	SMALL
	LARGE
	MIDDLE

※3 POSITION MOTOR(SMALL)/POSITION MOTOR(LARGE)		
POSITION MOTOR (SMALL)	POSITION MOTOR (LARGE)	OPERATION
H	H	BRAKE
H	L	SMALL
L	H	LARGE
L	L	STOP

4. CASSETTE IN → CASSETTE DOWN (STAGE SMALL → LARGE )





NOTE :

※1 CC DOWN MOTOR/CC UP MOTOR

CC DOWN NOTOR	CC UP MOTOR	OPERATION
H	H	BRAKE
H	L	CASSETTE DOWN
L	H	CASSETTE UP
L	L	STOP

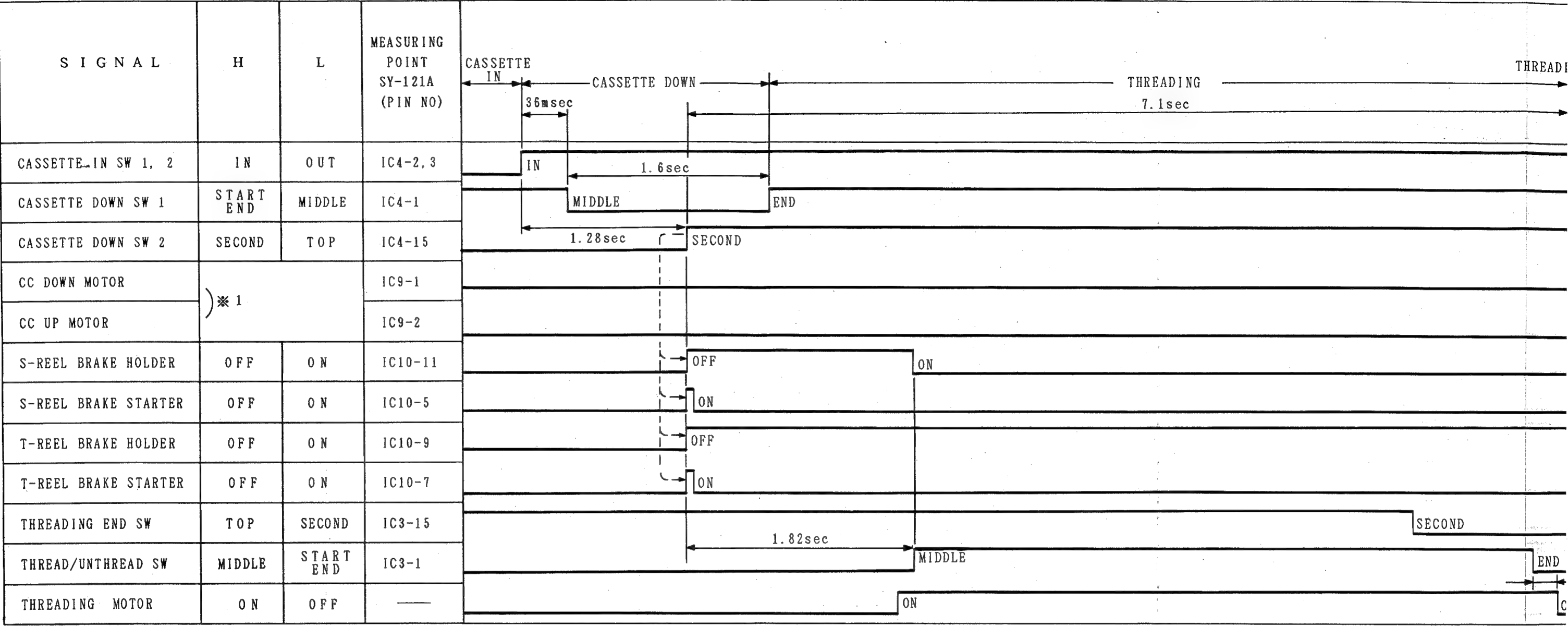
※2 SMALL POSITION/LARGE POSITION

SMALL POSITION	LARGE POSITION	OPERATION
H	H	ILLEGAL
H	L	SMALL
L	H	LARGE
L	L	MIDDLE

※3 POSITION MOTOR(SMALL)/POSITION MOTOR(LARGE)

POSITION MOTOR (SMALL)	POSITION MOTOR (LARGE)	OPERATION
H	H	BRAKE
H	L	SMALL
L	H	LARGE
L	L	STOP

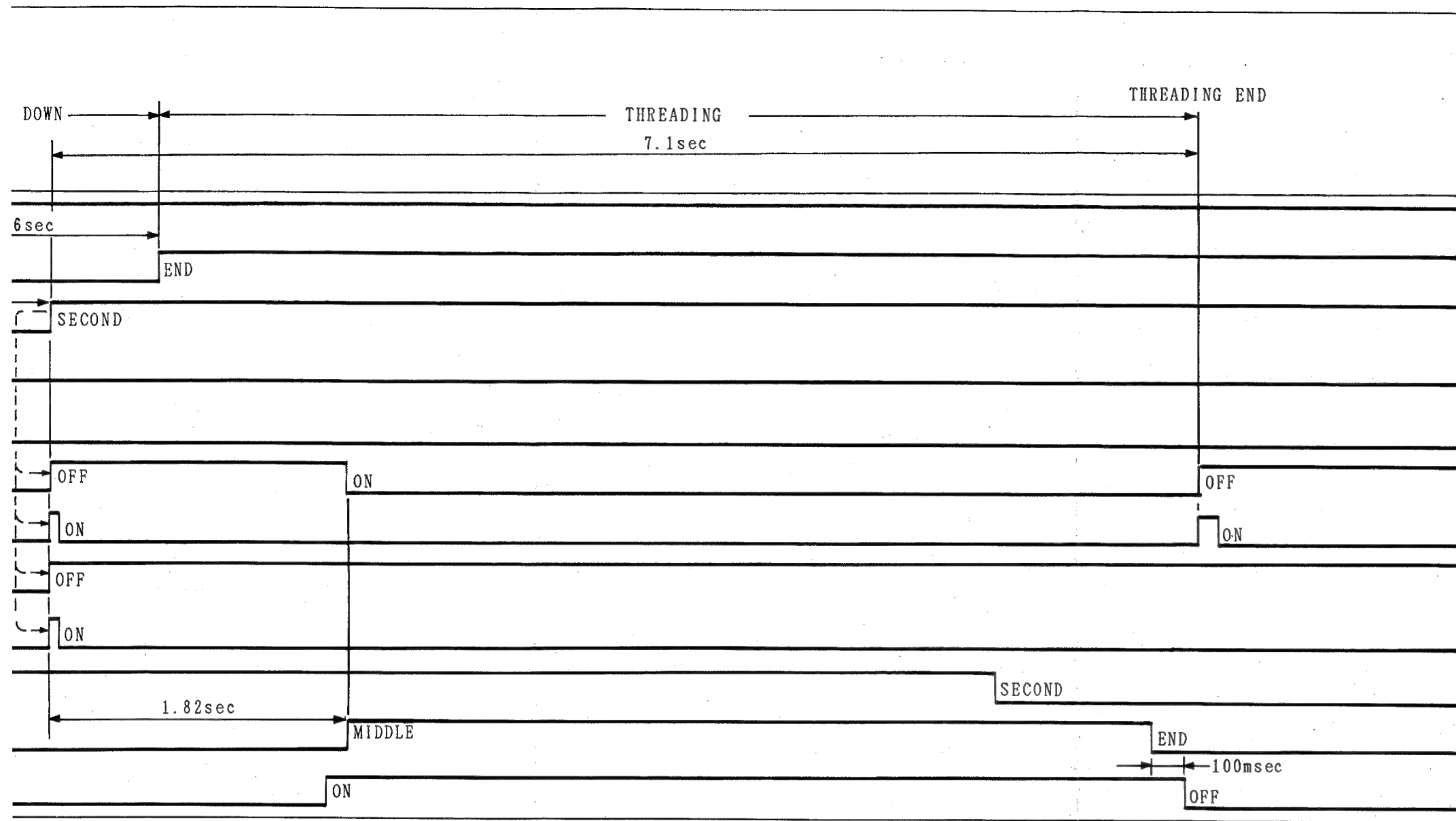
5. CASSETTE IN → THREADING (LARGE)



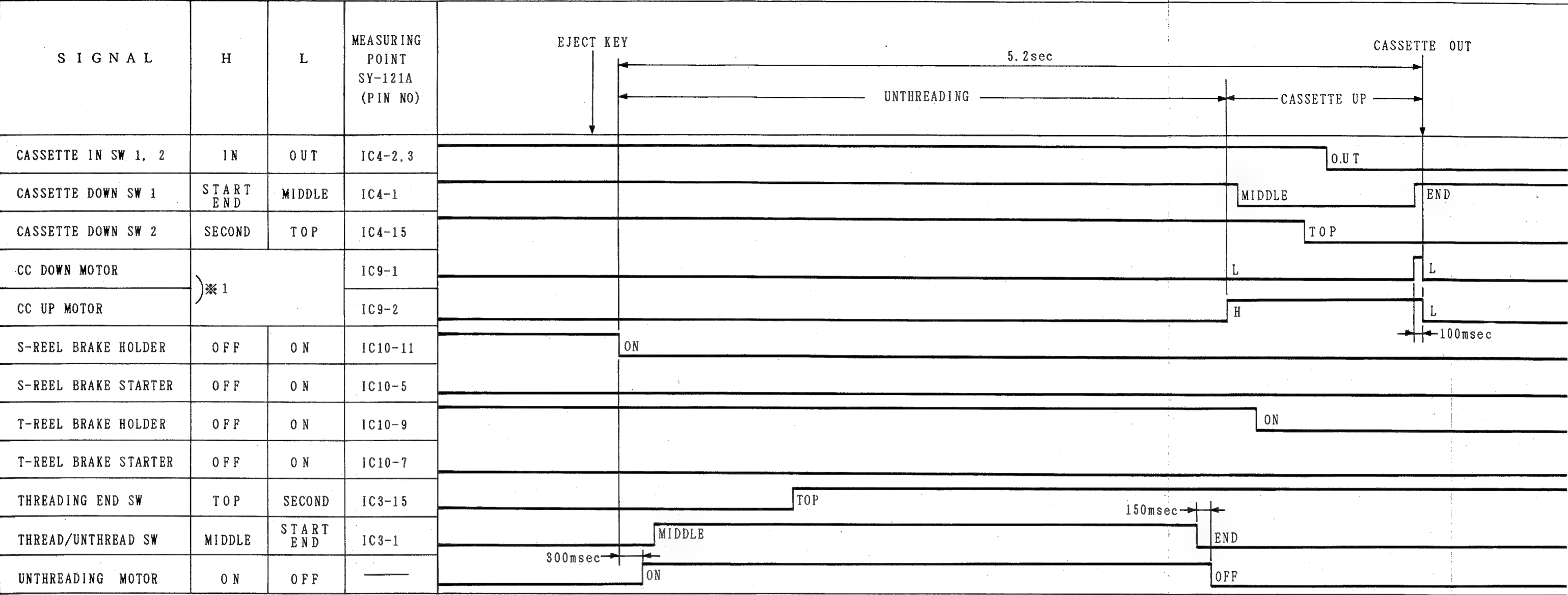
NOTE :

※1 CC DOWN MOTOR/CC UP MOTOR

CC DOWN MOTOR	CC UP MOTOR	OPERATION
H	H	BRAKE
H	L	CASSETTE DOWN
L	H	CASSETTE UP
L	L	STOP



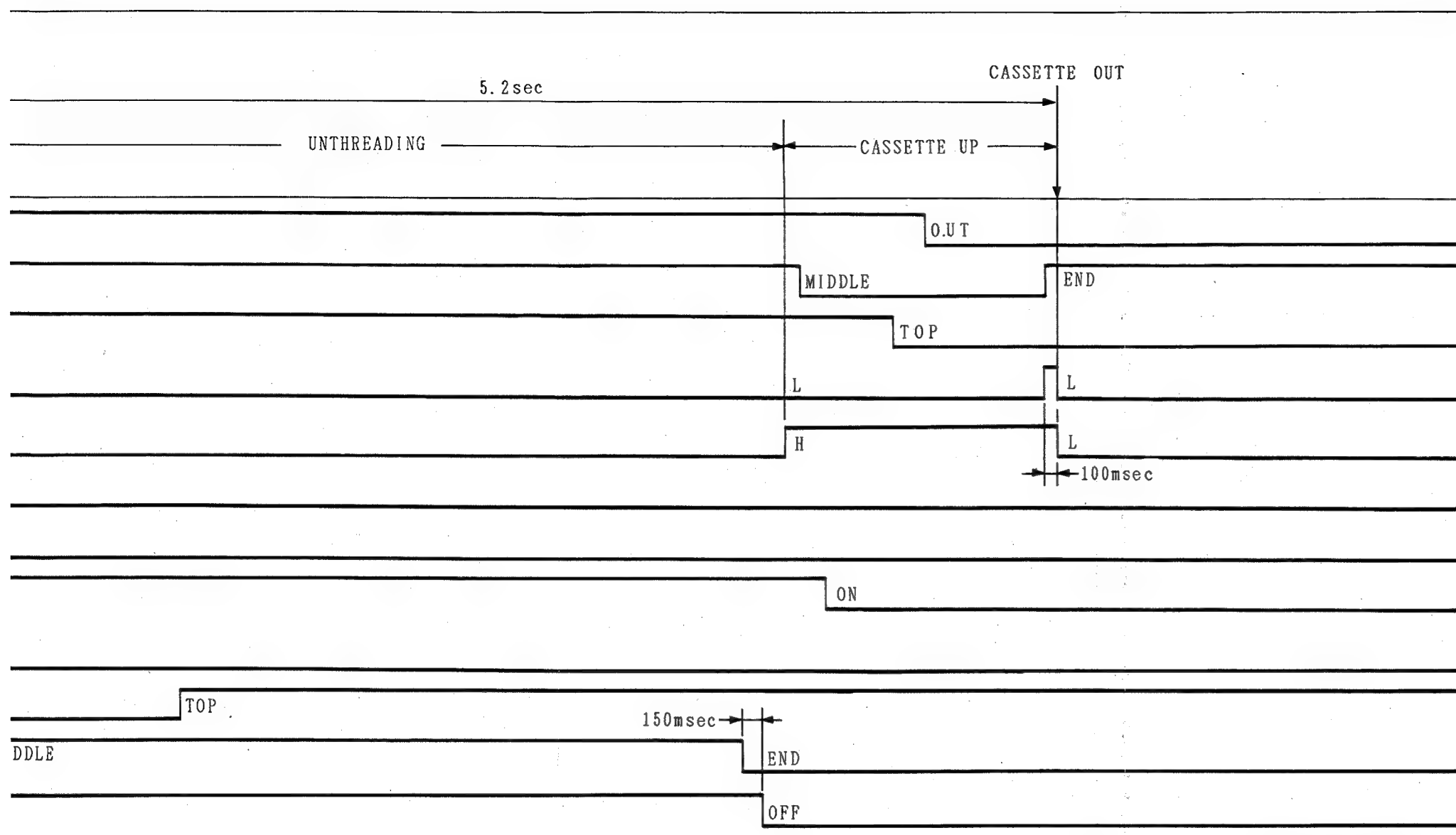
6.EJECT (UNTHREADING) → CASSETTE OUT (LARGE)



NOTE :

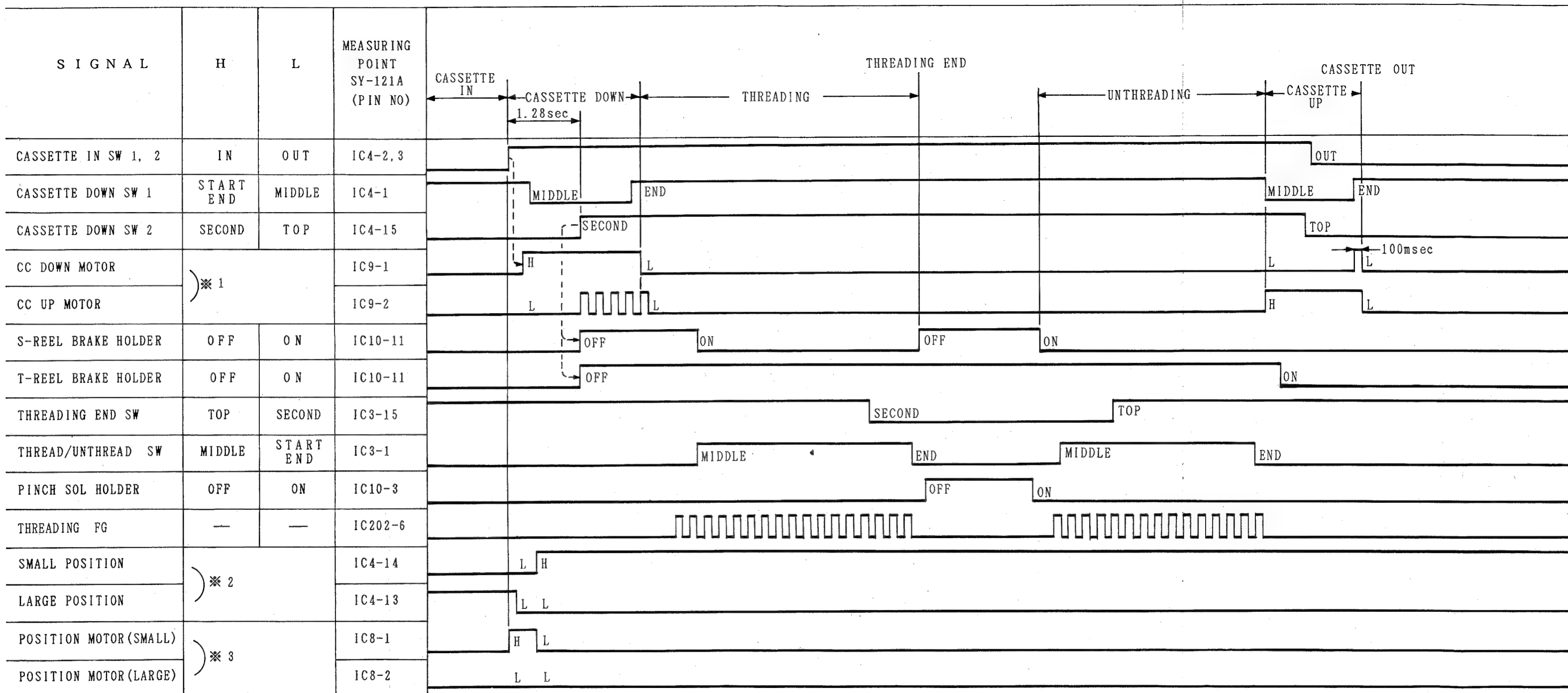
※1 CC DOWN MOTOR/CC UP MOTOR

CC DOWN MOTOR	CC UP MOTOR	OPERATION
H	H	BRAKE
H	L	CASSETTE DOWN
L	H	CASSETTE UP
L	L	STOP





7. CASSETE IN → THREADING END → CASSETTE OUT (STAGE SMALL → LARGE)



NOTE :

※1 CC DOWN MOTOR/CC UP MOTOR

CC DOWN MOTOR	CC UP MOTOR	OPERATION
H	H	BRAKE
H	L	CASSETTE DOWN
L	H	CASSETTE UP
L	L	STOP

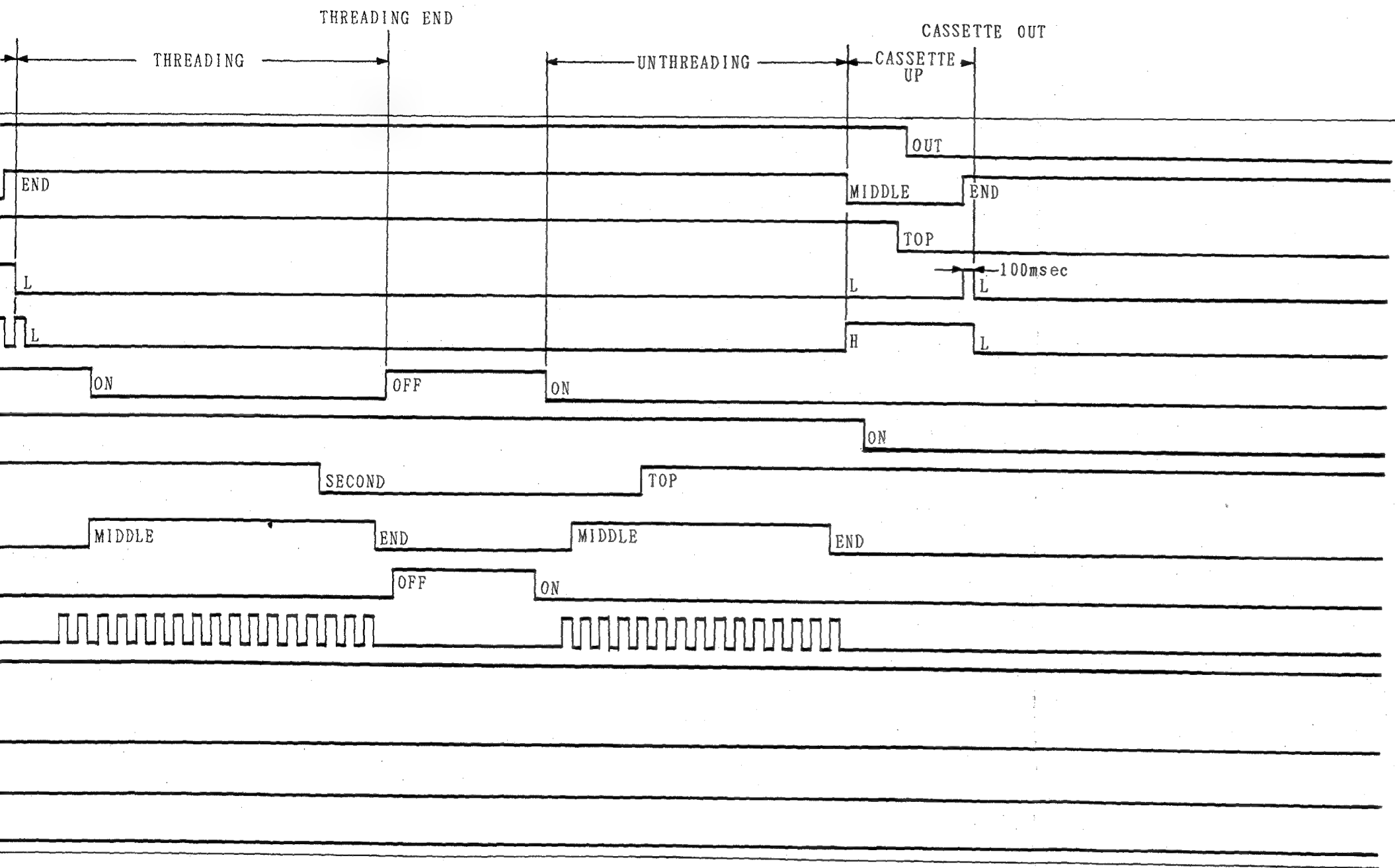
※2 SMALL POSITION/LARGE POSITION

SMALL POSITION	LARGE POSITION	OPERATION
H	H	ILLEGAL
H	L	SMALL
L	H	LARGE
L	L	MIDDLE

※3 POSITION MOTOR (SMALL)/POSITION MOTOR (LARGE)

POSITION MOTOR (SMALL)	POSITION MOTOR (LARGE)	OPERATION
H	H	BRAKE
H	L	SMALL
L	H	LARGE
L	L	STOP

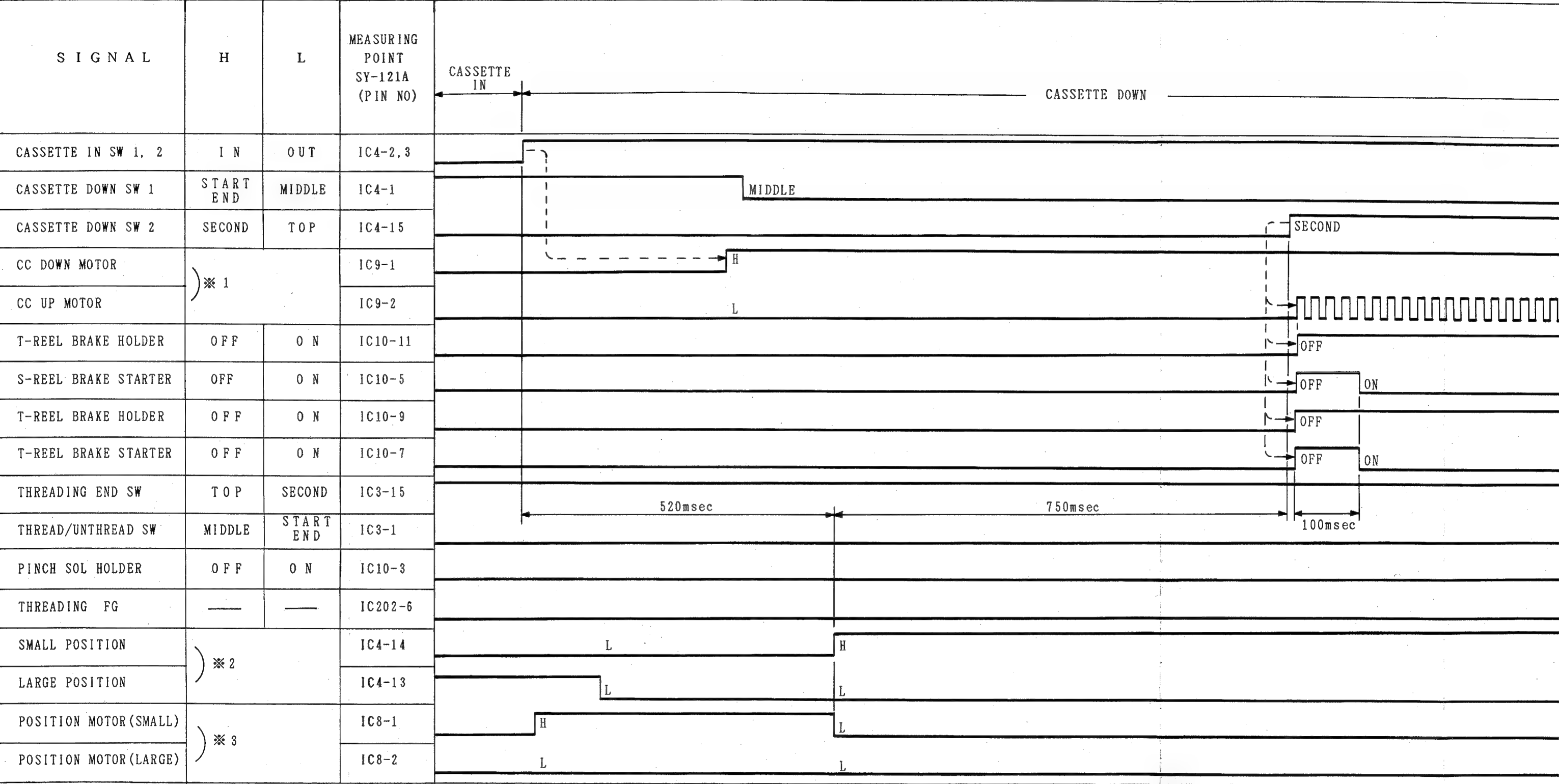
(STAGE SMALL → LARGE)



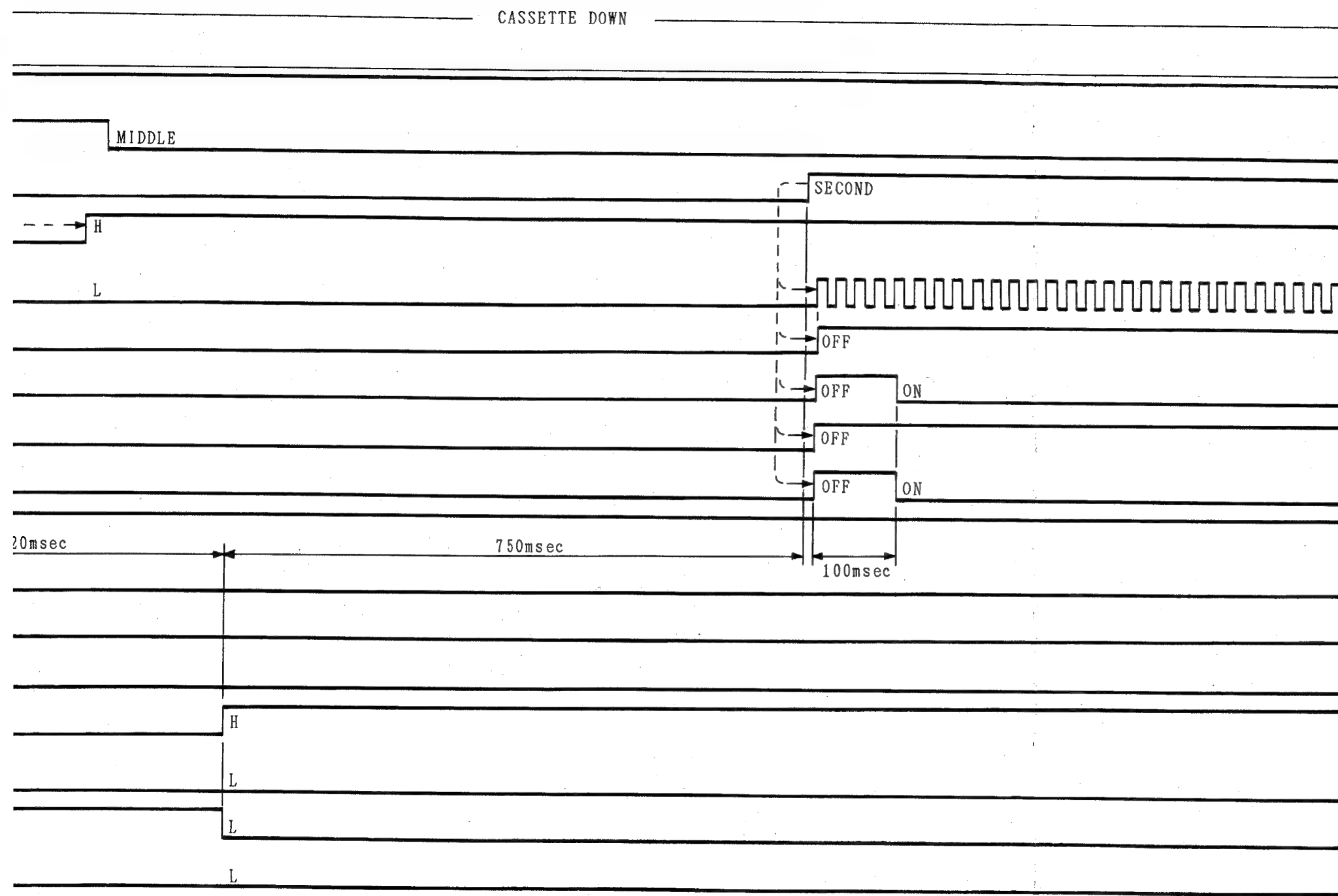
ON	OPERATION
	ILLEGAL
	SMALL
	LARGE
	MIDDLE

※3 POSITION MOTOR(SMALL)/POSITION MOTOR(LARGE)		
POSITION MOTOR (SMALL)	POSITION MOTOR (LARGE)	OPERATION
H	H	BRAKE
H	L	SMALL
L	H	LARGE
L	L	STOP

8.CASSETTE IN → CASSETTE DOWN (STAGE LARGE → SMALL)



ALL)



NOTE :

※1 CC DOWN MOTOR/CC UP MOTOR

CC DOWN NOTOR	CC UP MOTOR	OPERATION
H	H	BRAKE
H	L	CASSETTE DOWN
L	H	CASSETTE UP
L	L	STOP

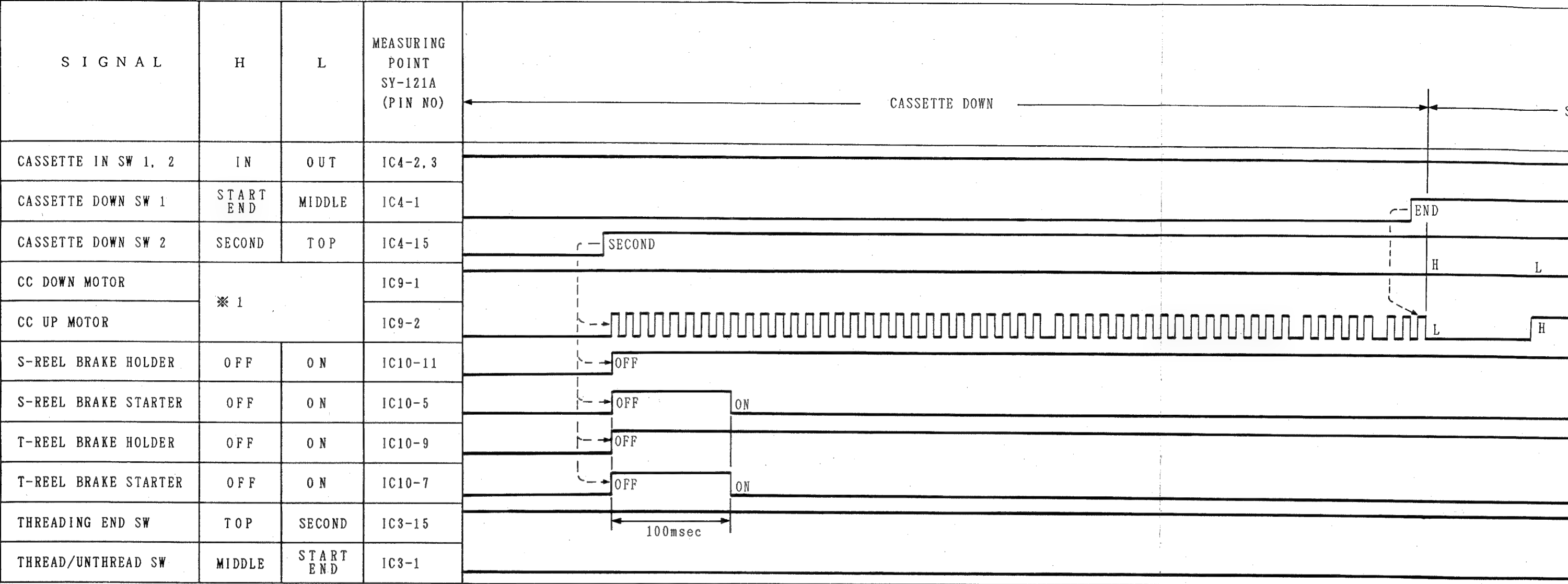
※2 SMALL POSITION/LARGE POSITION

SMALL POSITION	LARGE POSITION	OPERATION
H	H	ILLEGAL
H	L	SMALL
L	H	LARGE
L	L	MIDDLE

※3 POSITION MOTOR(SMALL)/POSITON MOTOR(LARGE)

POSITION MOTOR (SMALL)	POSITION MOTOR (LARGE)	OPERATION
H	H	BRAKE
H	L	SMALL
L	H	LARGE
L	L	STOP

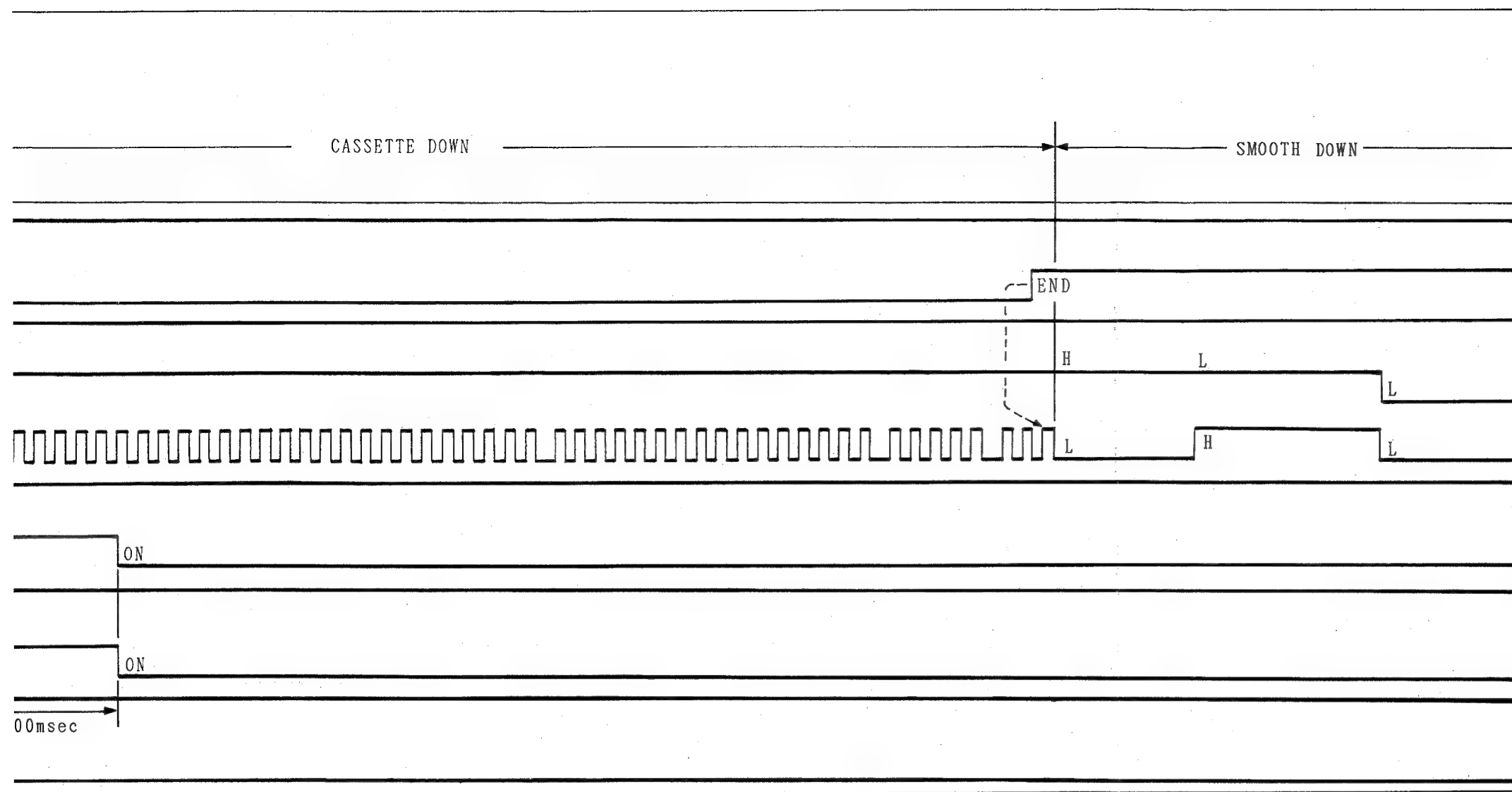
9. CASSETTE DOWN → SMOOTH DOWN



NOTE :

※1 CC DOWN MOTOR/CC UP MOTOR

CC DOWN MOTOR	CC UP MOTOR	OPERATION
H	H	BRAKE
H	L	CASSETTE DOWN
L	H	CASSETTE UP
L	L	STOP



## SECTION 3 PERIODIC CHECK AND MAINTENANCE

### 3-1. SYSTEM CONTROL OPERATION CHECK

The following should be checked daily before operation.

The check procedure described here is primarily for the BVW-22P but can also be applied to operating the remote control unit.

Note that the switches must be set according to how the machine is used after the checks.

- . Thread a recorded tape (Video, Audio CH-1/CH-2/CH-3/CH-4). (Do not use an alignment tape.)
- . Connect a video/audio monitor.
- . Select switch setting;

POWER	: ON
AUDIO MONITOR	: MIX
AUDIO OUT	: LNG
CTL/TC/U-BIT	: CTL
TRACKING	: FIX

# Action

# Check that

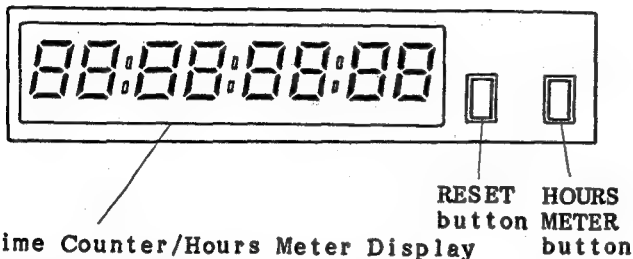
Insert the cassette	
Press F.FWD .....	F.FWD function check
Press STOP .....	STOP function check
Press PLAY .....	PB function check (video/audio CH-1 and audio CH-2 are present). The playback sound is increased when the HEADPHONES control is turned clockwise with the headphones connected to the HEADPHONES jack.
Set AUDIO/OUTPUT switch to AFM ..	PB function check (audio CH-3 and CH-4 are present). The playback sound is increased when the HEADPHONES control is turned clockwise with the headphones connected to the HEADPHONES jack.
Press SEARCH/FORWARD .....	+3.5 times normal speed SEARCH function check
Press SEARCH/REVERSE .....	-3.5 times normal speed SEARCH function check.
Press time counter's RESET .....	(The counter reading becomes zero.)
Set CTL/TC/U-BIT select switch to TC .....	The counter display is set to the TC mode.
Press REW .....	REW function check (The tape is automatically stopped at tape top.)
Press EJECT .....	EJECT function check (The cassette is ejected.)



### 3-2. DIGITAL HOURS METER

#### 3-2-1. Outline

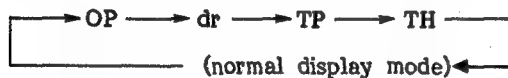
Generally, time counter is displayed in the Time Counter/Hours Meter display. Press the HOURS METER button, hours meter is displayed on the Time Counter/Hours Meter Display.



It is recommended to perform the periodic checks and maintenance based on the hours meter.

#### 3-2-2. Mode Selection

When the HOURS METER button is pressed, the display rotates in the sequence shown below.



NOTE: Hours Meter display changes to the Time Counter automatically after 5 seconds elapsed of time.

#### 3-2-3. Description of the Display Mode

1. OP: OPERATION METER mode
  - . Displays accumulated time that the power of the unit has been turned on.
2. dr: DRUM RUNNING METER mode
  - . Displays accumulated rotation time of the drum in the threading end mode.
3. TP: TAPE RUNNING METER mode
  - . Displays accumulated tape running time in the F.FWD REW, PLAY, and SEARCH modes.
4. TH: THREADING/UNTHREADING COUNTER mode
  - . Displays accumulated number of threading and unthreading operations.

##### . OP, dr, and TP

These modes display the accumulated time. Maximum displayed time is 9999H, if over this time, display returns to 0000H.

##### . TH

This mode displays the number of operations instead of the hours. Maximum displayed number is 99999, if over this number, display returns to 00000.

### 3-3. MAINTENANCE AFTER REPAIRS

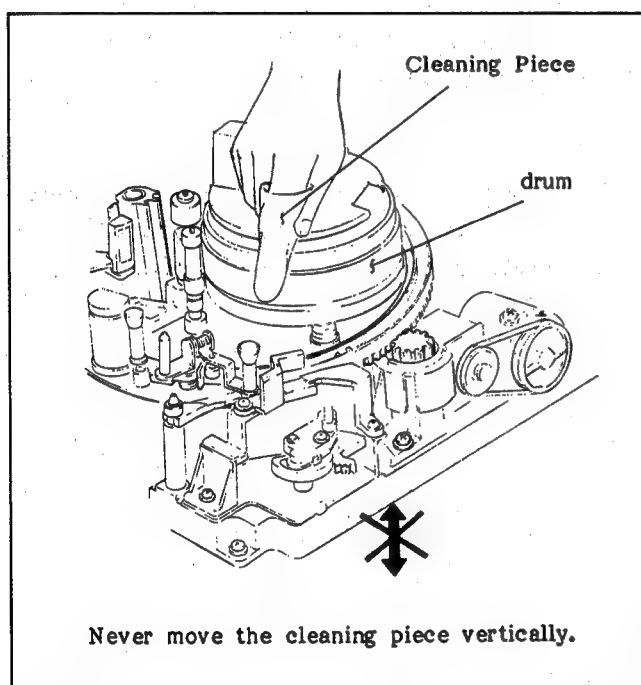
Perform the following maintenance after repairs regardless of the unit operating hours:

1. Video heads and stationary heads cleaning.  
(Refer to Sections 3-3-1 and 3-3-2.)
2. Tape movement area cleaning.  
(Refer to Section 3-3-3.)

**NOTE:** Wait until the cleaning fluid evaporates completely before inserting a cassette tape.

#### 3-3-1. Cleaning Procedure of the Video Head

Press a cleaning piece moistened with cleaning fluid and turn the drum slowly with hand.



**NOTE:** Never move the cleaning piece in the vertical direction of the head tip.

- . Clean the head with the power off.

#### 3-3-2. Cleaning Procedure of the Stationary Heads

Clean with a cleaning cloth moistened with cleaning fluid.

#### 3-3-3. Cleaning Procedure of the Tape Movement Areas

Wipe the tape bearing surfaces (of the tape guides, drum, capstan and pinch roller) with a cleaning piece moistened with cleaning fluid.

**NOTE:** Do not clean the surface of the condensation sensor on the lower drum with the moistened cleaning piece; clean it with a dry cloth.

### 3 - 4. PERIODIC CHECK

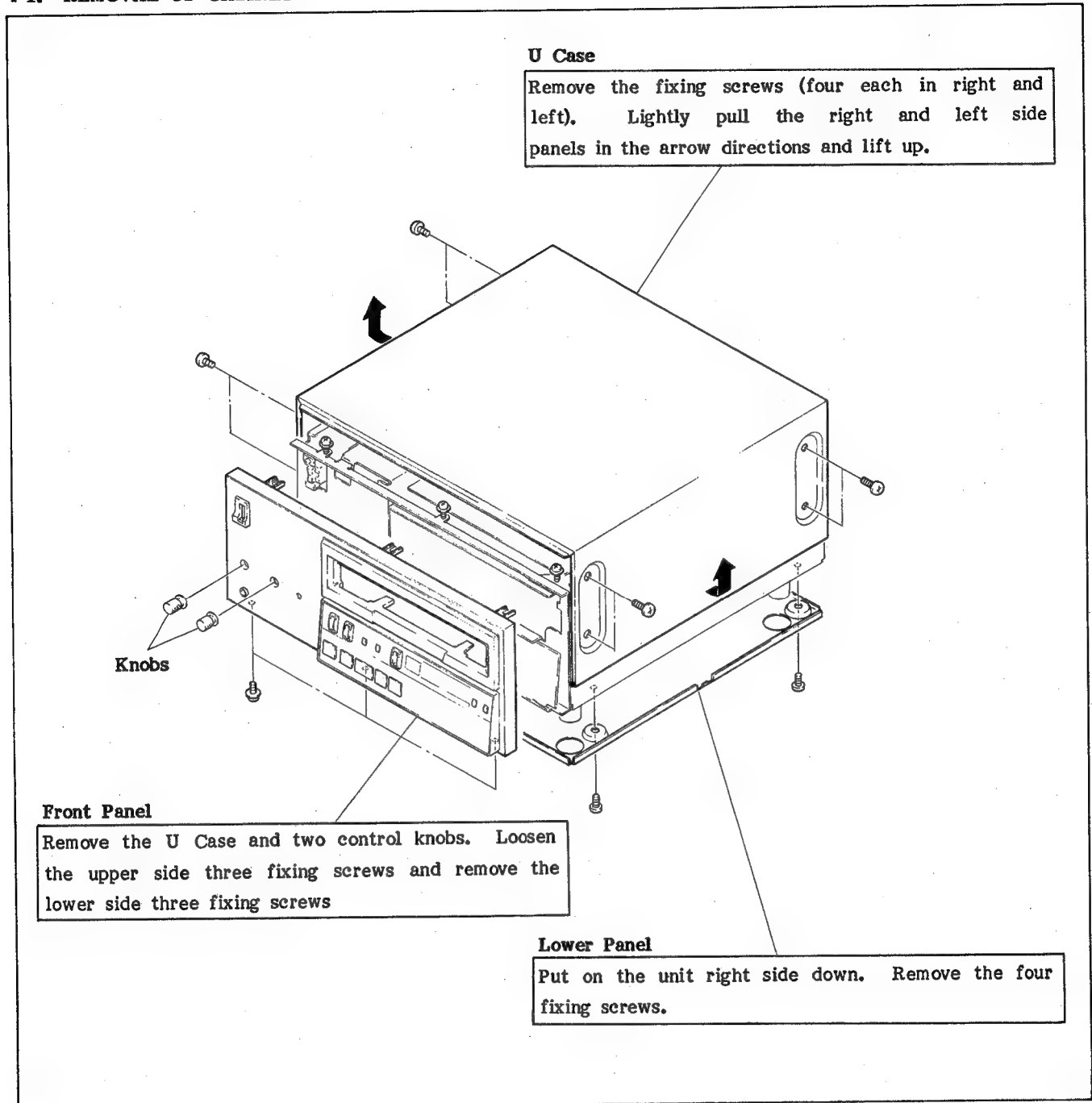
Perform the maintenance checks described in the table in accordance with the operational hours of the unit.

Item	Parts No.	HOURS METER Mode	Replacement period	Remarks
Replacement of the upper drum	A-6762-377-A	dr	1,000H	Life of the video head is affected extensively by operational environment and tape.  Perform the cleaning every 500 hours.
Replacement of the brush	A-6050-575-A	dr	3,000H	
Replacement of the slip ring	A-6050-576-A	dr	3,000H	
Replacement of the pinch roller	X-3717-215-2	TP	1,000H	
Replacement of the head drum	A-6050-582-A	dr	3,000H	Perform the tape movement area of the drum cleaning every 500 hours.
Replacement of the TG1 tape guide	A-6746-027-C	TP	3,000H	
Replacement of the TG2 tape guide	A-6746-028-C	TP	3,000H	
Replacement of the TG3 tape guide	A-6746-029-C	TP	3,000H	
Replacement of the TG4 tape guide	A-6746-030-C	TP	3,000H	
Replacement of the tape guide upper and lower frange on the threading ring	3-717-267-01 3-680-812-00	TP	3,000H	
Replacement of the tape guide upper and lower frange	3-717-267-01 3-717-293-01	TP	3,000H	
Replacement of the reel motor	A-6737-175-A	TP	3,000H	

Item	Parts No.	HOURS METER Mode	Replacement period	Remarks
Replacement of the capstan motor	8-835-259-02	TP	3,000H	
Replacement of the audio confi head	8-825-771-11	TP	3,000H	Perform the cleaning every 500 hours.
Replacement of the CTL head	8-825-554-73	TP	3,000H	Perform the cleaning every 500 hours.
Replacement of the thtrading belt (LM belt)	3-688-066-01	TH dr	100,000times 4,000H	} Replace this parts when either TH or dr reaches the indicated time.  Perform the cleaning every 500 hours.
Replacement of the gear box	A-6750-213-A	TH	200,000times	Never replace the threading motor individually, replace the whole of the gear box assembly.
Replacement of the T gear 1 Ass'y	X-3717-250-1	TH	100,000times	
Replacement of the S/T brake solenoid	1-454-417-41	TH	200,000times	
Replacement of the pinch solenoid	1-454-338-00	TP	3,000H	
Replacement of the cassette-up compatment	A-6751-383-B	TH	100,000times	Never replace the cassette-up compartment motor individually, replace the whole of the cassette-up compartment assembly.
Replacement of the main brake	A-6741-066-A	TH	200,000times	
Replacement of the ring-roller	3-675-866-00	TH	200,000times	It is required that perform the tape run adjustment, tracking adjustment and so on after this parts replacemnt. It is recommended to replace this parts when overhauling.

## SECTION 4 SERVICE INFORMATION

### 4-1. REMOVAL OF CABINET



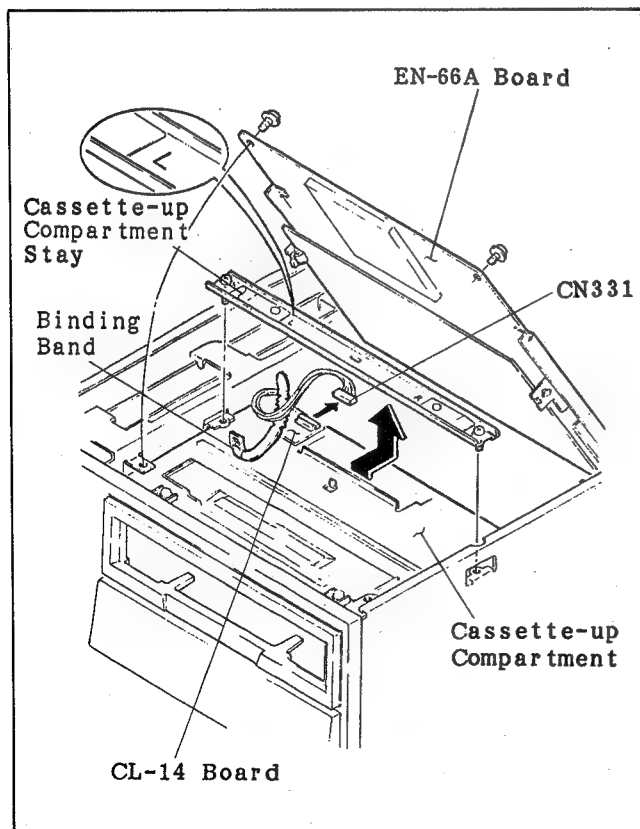
#### 4-2. REMOVAL/INSTALLATION OF CASSETTE-UP COMPARTMENT

##### . Removal

1. Remove the U Case. (Refer to Section 4-1.)
2. Remove the two fixing screws of the EN-66A Board, and then open the EN-66A Board.
3. Remove the Binding Band.
4. Loosen the two fixing screws and remove the Cassette-up Compartment Stay. (This screw has a retainer.)
5. Disconnect connector CN331 on the CL-14 Board.
6. Move the Cassette-up Compartment in the direction as shown in the figure. Lift the Cassette-up Compartment Block slowly.

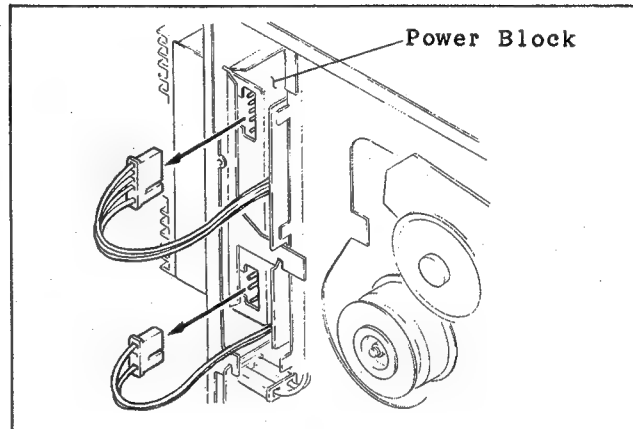
##### . Installation

7. Install the Cassette-up Compartment.
8. Connect the connector CN331.
9. Make sure that the marked "L" on the Cassette-up Compartment Stay is on the left side; tighten the screw. And then tighten the screw on the right side.
10. Bind the Cassette-up Compartment Stay and the harness with the Binding Band.

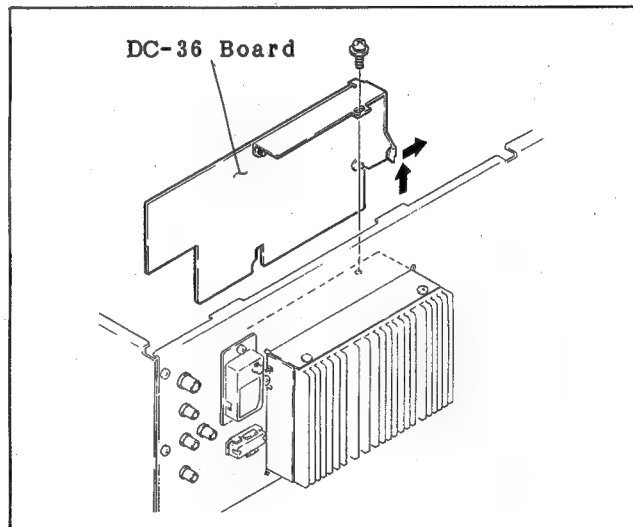


#### 4-3. REMOVAL OF THE POWER BLOCK

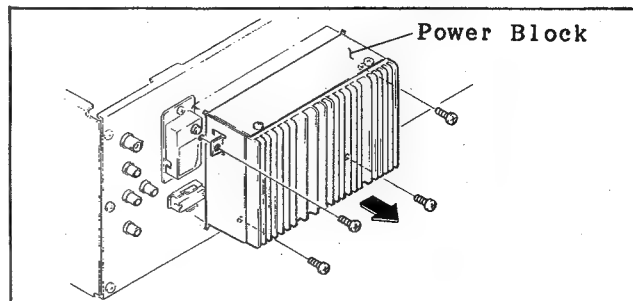
1. Remove the U Case and the Lower Panel.
2. Disconnect the connectors as shown in the figure.



3. Remove the fixing screws as shown in the figure, and move the DC-36 Board in the direction as shown in the figure, and then remove the DC-36 Board.



4. Remove the four fixing screws as shown in the figure and remove the Power Block.



#### 4-4. SPARE PARTS

- (1) The components identified by marked  $\Delta$  or dotted line with  $\Delta$  are critical to safety.  
Replace only with the same components as specified.
- (2) Replacement parts supplied from the Sony Parts Center will sometimes have a different shape and outside view from the parts which are used in the unit. This is due to "accommodating improved parts and/or engineering changed" or "standardization of genuine parts".
  - . This manual's exploded views and electrical spare parts lists indicate the part numbers of "the present standardized genuine parts".
  - . Regarding engineering part changes by our engineering department, refer to Sony service bulletins and service manual supplements.
- (3) The parts marked with "s" in the SP column of the exploded views and electrical spare parts lists are normally stocked for replacement purposes. The parts marked with "o" in the SP column are not normally required for routine service work. Orders for parts marked with "o" will be processed, but allow for additional delivery time.

#### 4-5. HOW TO OPERATE THE UNIT WITHOUT INSTALLING CASSETTE TAPE

The following procedures are described without installing the Cassette-up Compartment.

##### 1. Threading/Threading end mode

- (1) Turn ON the POWER.
- (2) Press any function button except EJECT, the threading ring rotates counterclockwise.  
This state is called threading mode.
- (3) The threading ring rotation is stopped. This state is called threading end mode.

##### 2. Unthreading/Unthreading end mode

- (1) Press the EJECT button in the threading end state, the threading ring rotates clockwise.  
This state is called unthreading mode.
- (2) The threading ring rotation is stopped. This state is called unthreading end mode.

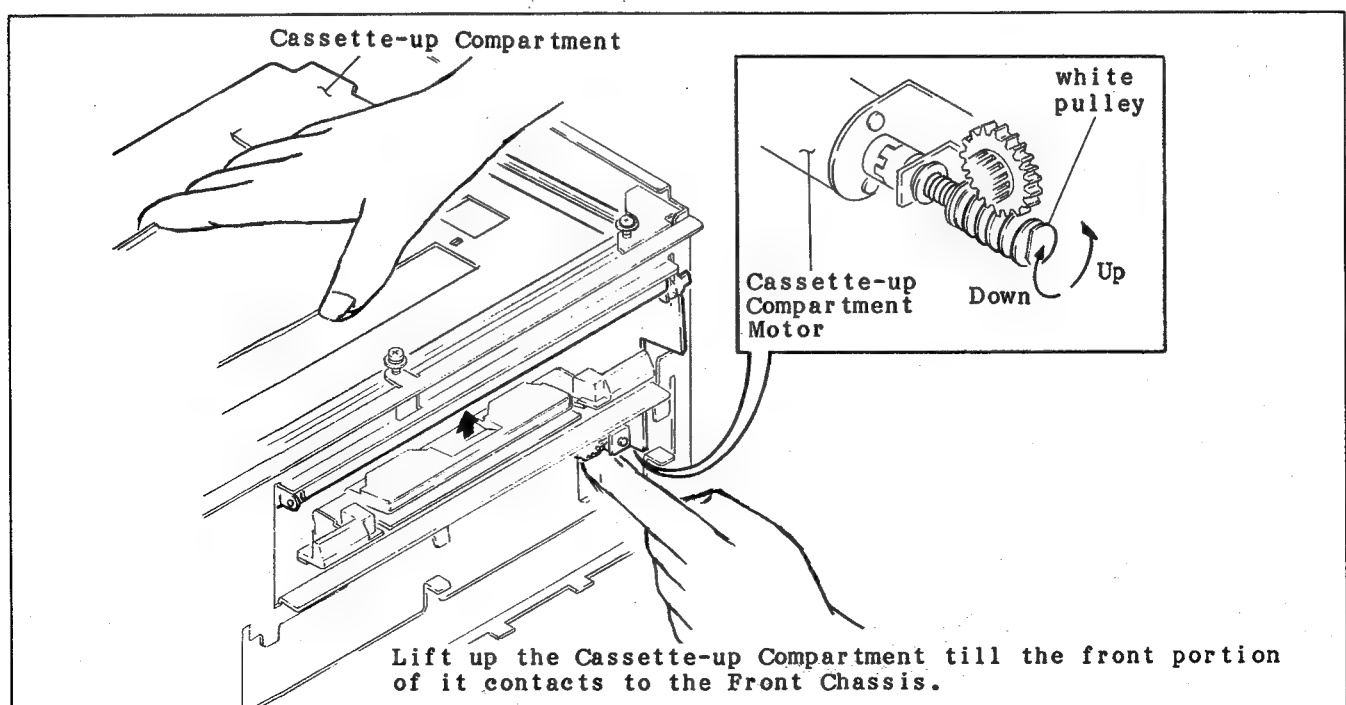
##### 3. PLAY

- (1) Turn ON the POWER, and press the PLAY button.  
The threading ring rotates counterclockwise direction, and then stops its rotation. The unit put into the PLAY mode. In this state, the pinch roller is pressed against the capstan shaft.

#### 4-6. HOW TO REMOVE A CASSETTE WHEN THE TAPE IS SLACKENED IN THE UNIT

When the tape in the unit is slack, remove the cassette tape by the following procedures:

1. Turn OFF the POWER.
2. Remove a U Case and a Front Panel.  
(Refer to Section 4-1.)
3. Remove the two fixing screws, and open the EN-66A Board.
4. Turn the pulley of the Gear Box Block until the Pinch Roller enters the EJECT completion mode.
5. Remove the Cassette-up Compartment Stay.
6. Disconnect connector CN331 on the CL-14 Board of the Cassette-up Compartment.
7. Remove the three fixing screws of the KY-130 Board, and open the KY-130 Board. (Never disconnect the connectors.)
8. Lift up the front side of the cassette-up compartment by hand.
9. Turn the white pulley as shown in the figure by hand while holding the cassette lid by hand to prevent it closing so that the Cassette-up Compartment moves up. Stop rotating the white pulley just before the Cassette-up Compartment moves to the surface.
10. Lift the Cassette-up Compartment slowly from the unit while holding the cassette lid.
11. Close the cassette lid carefully so that it is not damaged.
12. Remove the cassette from the Cassette-up Compartment.
13. Release the lock of the cassette lid, wind the tape into the cassette by turning the reel hub on the back of the cassette by hand.
14. Turn the pulley as Step 8 so that the stage of the Cassette-up Compartment moves the cassette out position.
15. Install the Cassette-up Compartment into the unit.
16. Connect the connector, then install the Cassette-up Compartment Stay.
17. Clean the Motor Belt of the Gear Box Block with a cloth moistened with cleaning fluid.
18. Locate the cause of the trouble and remedy the problem.





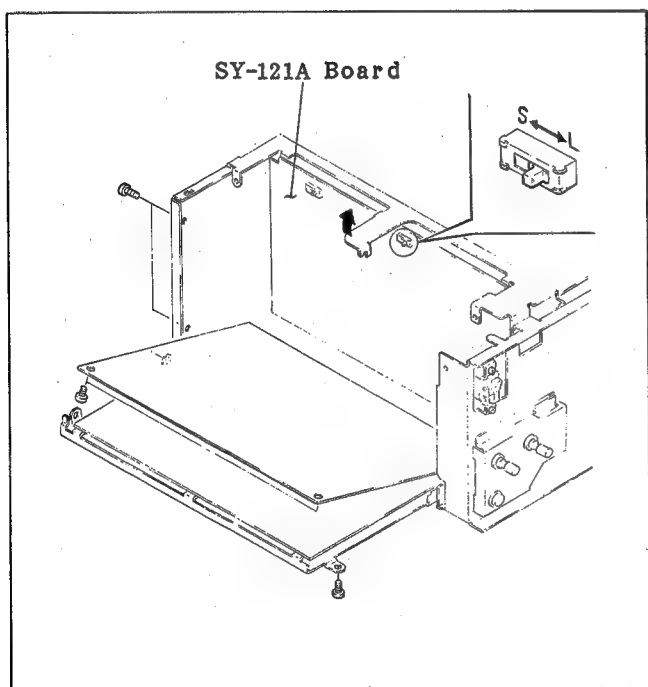
#### 4-7. HOW TO CHECK THE REEL TABLE OPERATION

- When POWER is turned ON, you can check whether the Reel Table moves to the specified position without inserting the cassette tape.
- If the Cassette-up Compartment is not installed when the mechanical adjustment is performed, the Reel Table can be moved to the position corresponding to an L or S cassette according to the procedures below.

1. Disconnect connector CN331 on the CL-14 Board of the Cassette-up Compartment.
2. Turn ON the power.
3. Select the switch S2 on the SY-121A Board to "L" or "S". The Reel Table moves to the specified position.

L: L cassette mode

S: S cassette mode



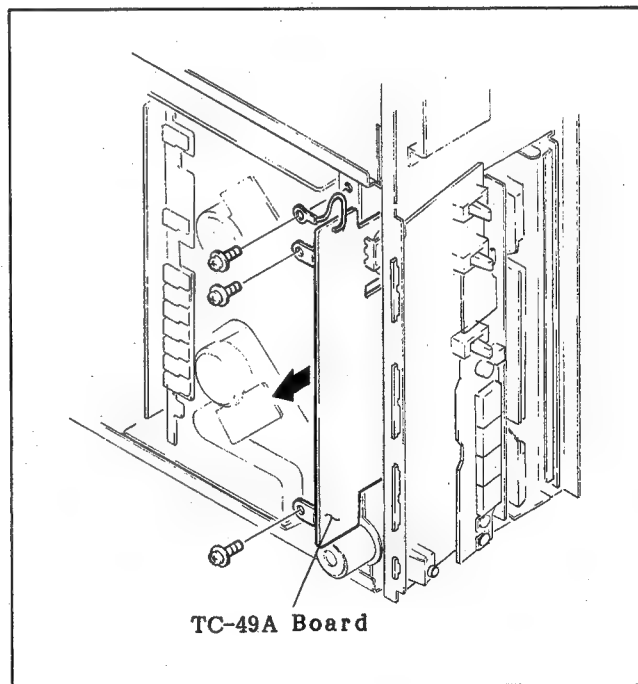
#### 4-8. NOTE FOR CHECK AND MAINTENANCE OF PRINTED CIRCUIT BOARD

Be sure to turn OFF the POWER switch before removing the printed circuit boards from the unit.

#### 4-9. SERVICE OF THE CIRCUIT BOARD

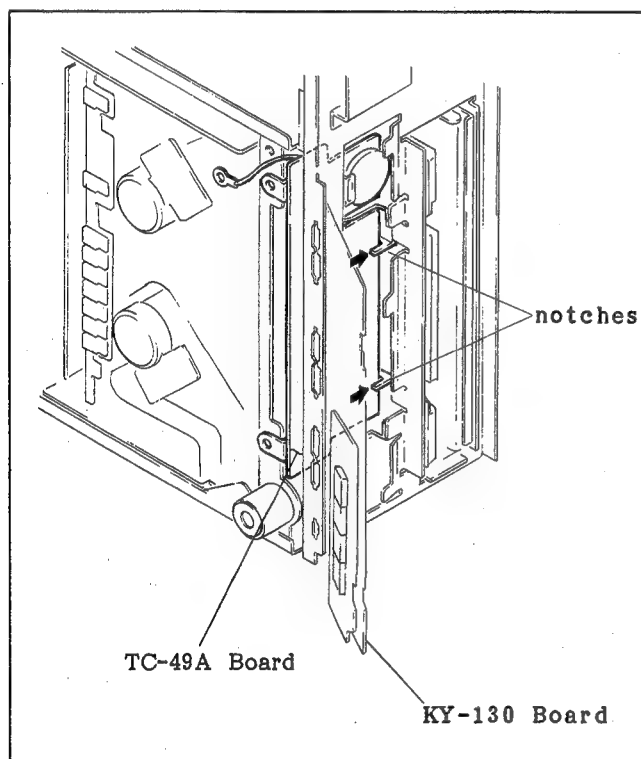
##### TC-49A BOARD

1. Remove a U Case and a Front Panel.
2. Place the unit right side down and remove a Lower Panel.
3. Disconnect the connectors, CN2, CN3, CN4 and CN5 on the TC-49A Board.
4. Remove the three fixing screws of the TC-49A Board, and then remove the TC-49A Board from the unit.
5. Connect the four connectors which is disconnected from the TC-49A Board in step 3.



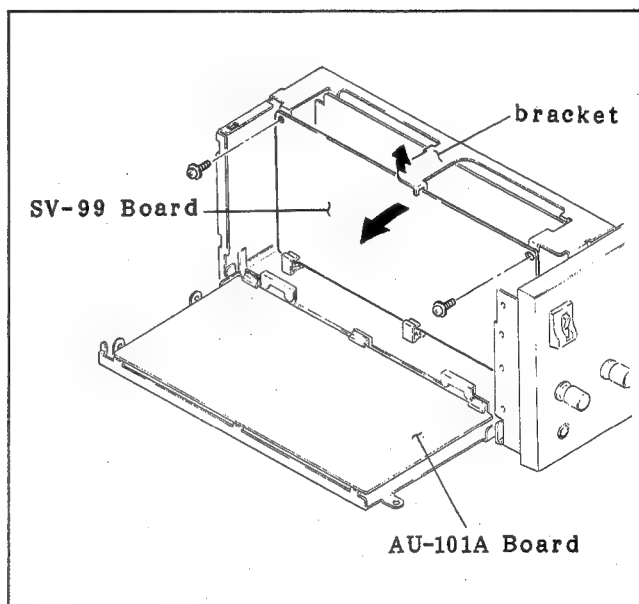
### Installing procedures

6. Remove the three fixing screws of the KY-130 Board, and open the KY-130 Board.
7. Disconnect the connectors CN2, CN3, CN4 and CN5.
8. Insert the TC-49A Board into the unit. At this time, confirm that the upper portion of the TC-49A Board is inserted into the notches correctly.
9. Install the KY-130 Board.
10. Assemble in the reverse steps 1 to 4.



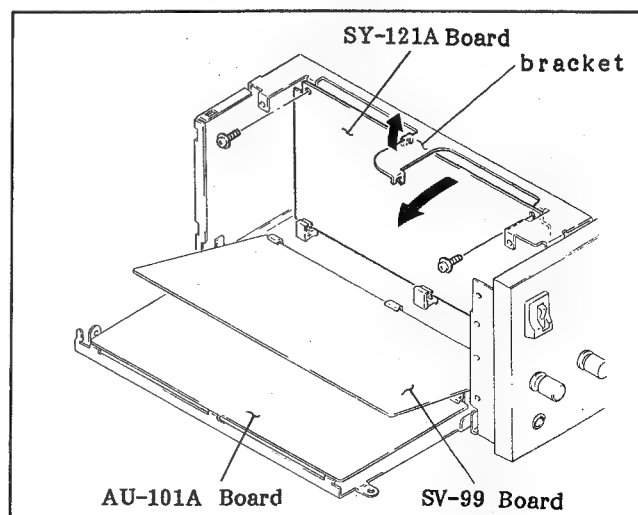
### SV-99 BOARD

1. Remove a U-Case.
2. Remove the three fixing screws on the frame of the AU-101A Board, and then open the AU-101A Board.
3. Remove the two fixing screws of the SV-99 Board.
4. Open the SV-99 Board, while pushing up the bracket on the chassis slightly by fingers.



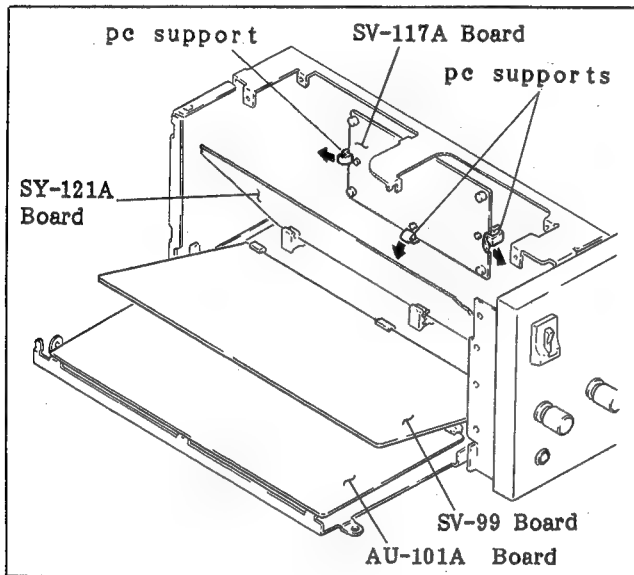
### SY-121A BOARD

1. Open the SV-99 Board (refer to service of the SV-99 Board).
2. Remove the two fixing screws of the SY-121A Board.
3. Open the SY-121A Board, while pushing up the bracket on the chassis slightly by fingers.



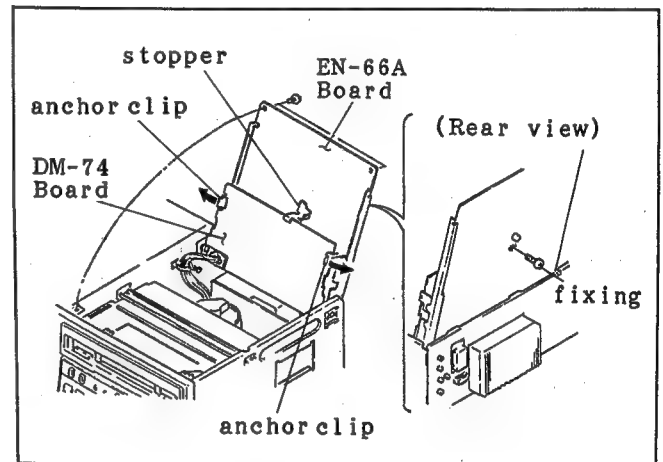
### SV-117A BOARD

1. Open the AU-101A Board, SV-99 Board and SY-121A Board (refer to service of the SV-99 Board and the SY-121A Board).
2. Binding the pc supports in the arrow directions.



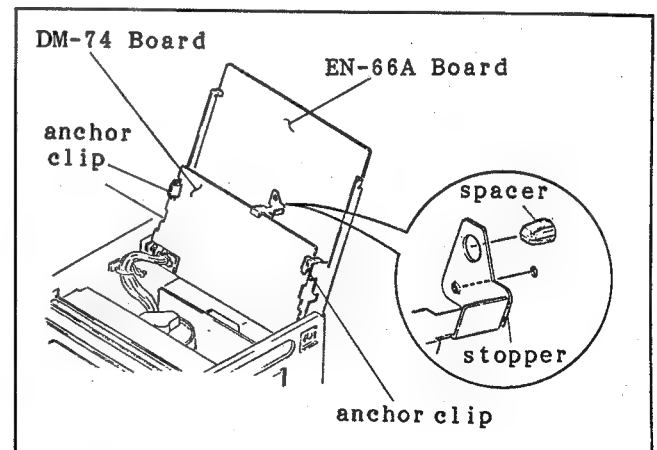
### DM-74 / EN-66A BOARD

1. Remove a U-Case.
2. Remove the two fixing screws of the EN-66A Board, and then open the EN-66A Board.
3. Remove a fixing screw as shown in figure, and then remove the stopper.
4. Binding the anchor clips in the arrow directions, and then open the DM-74 Board.



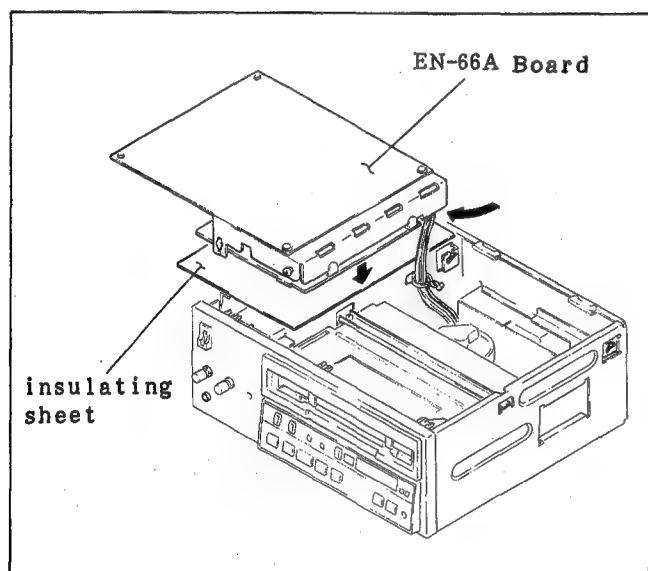
### Installing procedures

5. Clip the DM-74 Board with the anchor clips.
6. The large hole of the stopper fits to the spacer on the EN-66A Board, and then secure the stopper so that fasten the DM-74 Board with a fixing screw.

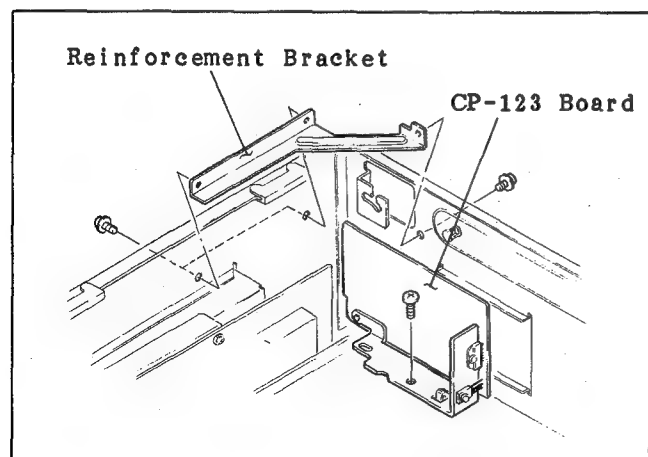


#### CP-123 BOARD

1. Open the EN-66A Board (refer to service of the DM-74 / EN-66A Board).
2. Place the insulating sheet such as papers on the left side of the unit as shown in the figure.
3. Remove the EN-66A Board Block from the unit, and then place it on the insulating sheet.

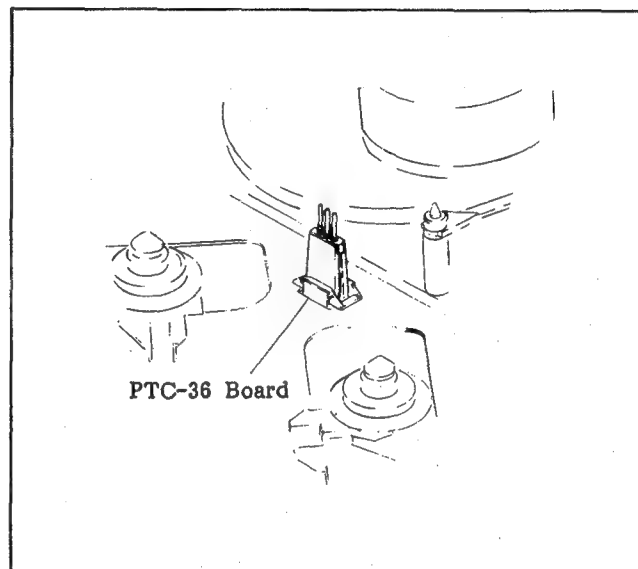


4. Remove the Reinforcement Bracket above the CP-123 Board.
5. Remove a fixing screw of the CP-123 Board which is installed on the chassis, and then remove the CP-123 Board.



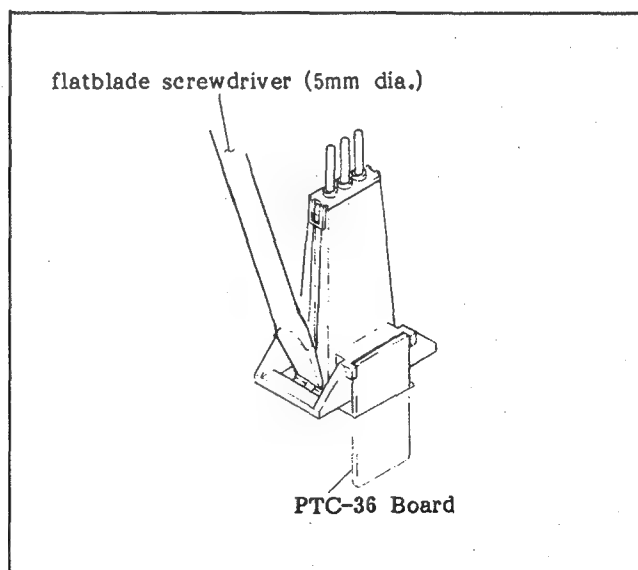
#### 4-10. HOW TO REMOVE THE DETECTION SWITCHES

The method of removing of the Detection Switch is described below.



While pushing the legs of one side (there are two legs each on the right and left sides) with a flatblade screwdriver (5 mm dia.), lift it. Then pull out the switch.

When installing it, be sure to install the PTC-36 Board in the front side.



**NOTE:** The detection switch lifts lightly so as not to disconnect the connector.

#### **4-11. NOTE FOR THE SLIP RING**

Handle the slip ring on the drum with care because it is easy to bend.

#### **4-12. HOW TO OPEN THE CASSETTE LID**

**Large cassette:** The lid is opened by releasing the projecting locks on both sides of the cassette.

**Small cassette:** The lid is opened by releasing the projecting lock on the left side as viewed from the top of the cassette.

#### 4-13. FIXTURE

Part number	Description	For use
J-6001-820-A	Drum Eccentricity Gauge (3)	Upper drum eccentricity adjustment
J-6001-830-A	Drum Eccentricity Gauge (2)	
J-6001-840-A	Drum Eccentricity Gauge (1)	
J-6031-820-A	Multi Connector Cable (BIBNC)	Video alignment
J-6080-011-A	Reel Table Tension Gauge	Brake torque adjustment
J-6086-570-A	Flatness Plate	Audio/TC head slantness adjustment
J-6087-000-A	Drum Eccentricity Gauge (5)	Upper drum eccentricity adjustment
J-6152-450-A	Wire Clearance Gauge	Clearance check
J-6190-800-A	Tension Regulator Slantness Check Tool	Tension regulator slantness check
J-6320-680-A	Reel Table Height Gauge	Reel table height adjustment
J-6320-870-A	Reel Motor Shaft Slantness Check Jig	Reel motor shaft slantness adjustment
J-6320-880-A	Cassette Reference Plate (L)	Reel table adjustment
Y-2031-001-0	Cleaning Fluid	Cleaning
2-034-697-00	Cleaning Piece	
7-723-902-00	Inspection Mirror	Video tracking adjustment
7-732-050-20	Tension Scale (50 g full scale)	Tension adjustment
7-732-050-30	Tension Scale (100 g full scale)	
8-960-096-51	Alignment Tape, CR2-1B PS	Video tracking tape
8-960-096-86	Alignment Tape, CR8-1B PS	Audio adjustment
8-960-096-91	Alignment Tape, CR5-1B PS	Video and audio alignment for recorder and player (metal particle tape)
96-0098-44	Alignment Tape, CR5-2A PS	Video alignment for recorder and player (oxide tape)
96-0098-45	Alignment Tape, CR8-1A PS	Audio alignment for recorder and player (oxide tape)
9-911-053-00	Thickness Gauge	Clearance check
Standard Products	Head Demagnetizer (HE-4)	Head demagnetizing

## SECTION 5 REPLACEMENT OF MAJOR PARTS

### 5-1. REPLACEMENT OF THE REEL MOTOR

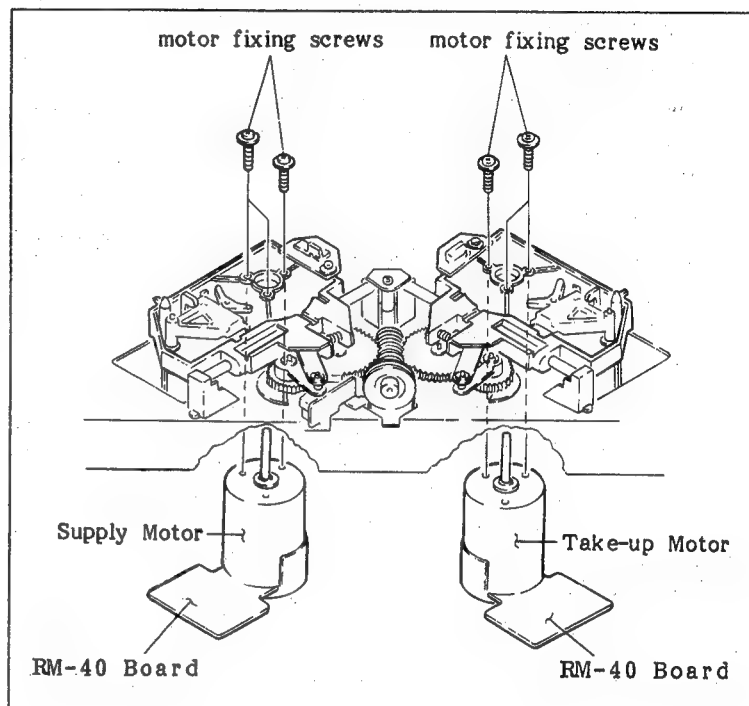
. Replacement procedures for the Take-up Reel Motor and the Supply Reel Motor are the same.

**Tool:** Hex. key (across flat has 1.5 mm)

**Mode:** Unthreading end mode

**Replacement procedure:**

- (1) Disconnect the three connectors of the RM-40 Board on the motor from the back of the unit.
- (2) Remove the Reel Table as described in replacement procedures (1) to (4) of Section 5-2, Replacement of the Reel Table.
- (3) Remove the three fixing screws of the motor as shown in the figure, replace it with a new one.
- (4) Perform the adjustments in Section 5-21.



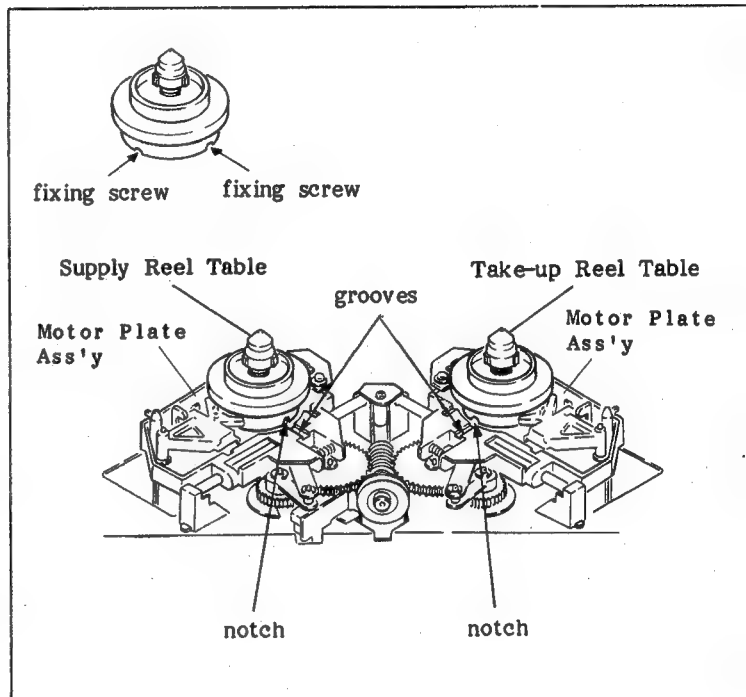
## 5-2. REPLACEMENT OF THE REEL TABLE

. Replacement procedures for the Take-up Reel Table and the Supply Reel Table are the same.

**Tool:** Hex. key (across flat has 1.5 mm)

### Replacement procedure:

- (1) Turn the Reel Table by hand so that the one of the two notches under the Reel Table is in the groove of the Motor Plate Ass'y.
- (2) Insert the hex. key along the groove into the Reel Table, loosen the fixing screw.
- (3) Turn the Reel Table more so that the other notch is in the groove of the Motor Plate Ass'y.
- (4) Loosen the fixing screw of the Reel Table as described in procedure (2).
- (5) Replace the Reel Table with a new one. (Be careful not to drop the washer.)
- (6) Clean the outer circumference of the Reel Table with a cloth moistened with cleaning fluid.
- (7) Perform the adjustments in Section 5-21.



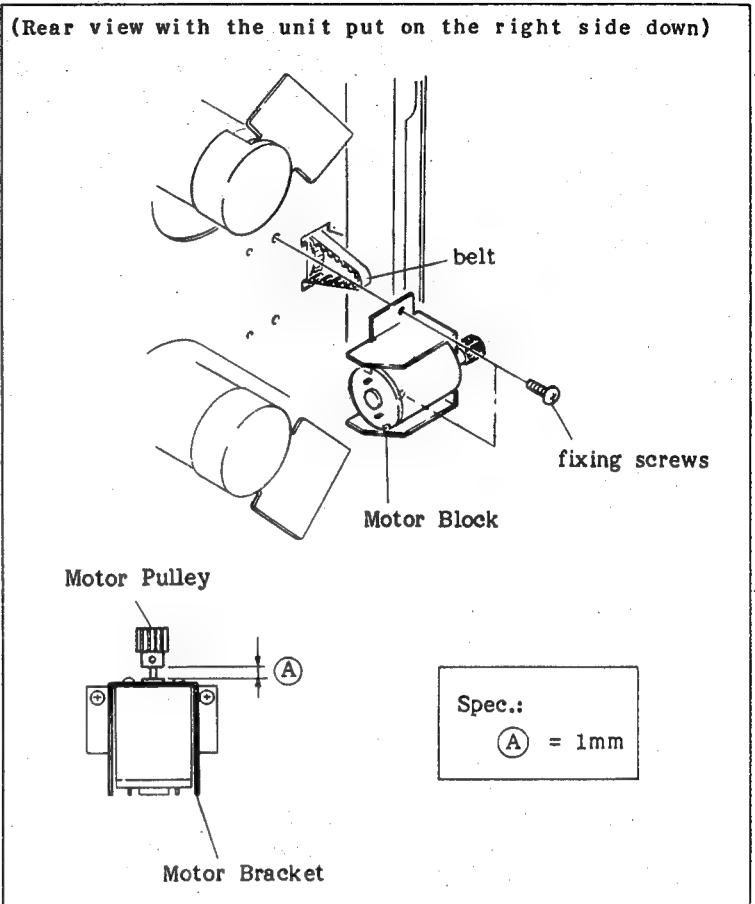


### 5-3. REPLACEMENT OF THE REEL TABLE TRANSFER MOTOR

**Tool:** Hex. key (across flat has 1.27 mm)

**Replacement procedure:**

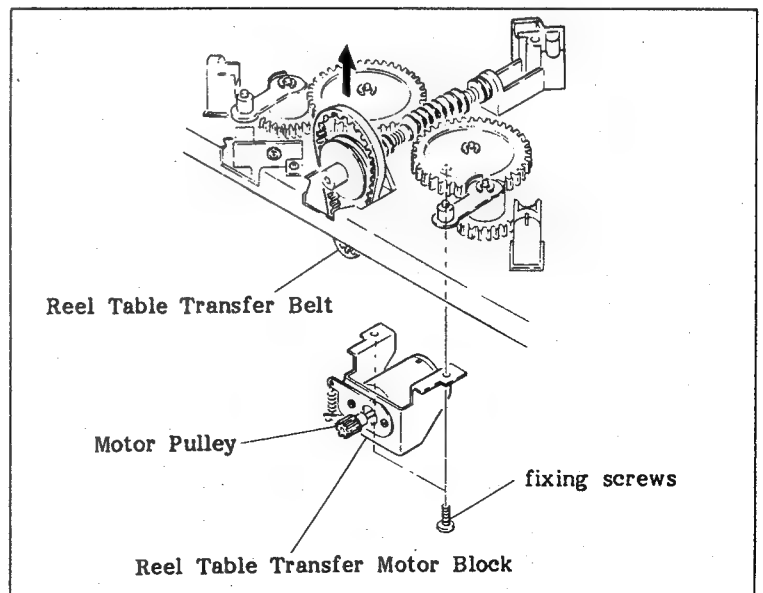
- (1) Put on the unit right side down.
- (2) Remove the two fixing screws as shown in the figure, remove the Motor Block from the unit.
- (3) Unsolder the two motor leads.
- (4) Remove the setscrew of the Motor Pulley.
- (5) Remove the two fixing screws from the Motor Bracket, replace it with the new one.
- (6) Solder the white lead to the "+" terminal of the motor and the red lead to the other terminal.
- (7) Install the Motor Pulley so that the clearance between the pulley and the Motor meets the required specification.
- (8) Hook the Reel Table Transfer Belt to the Motor Pulley, then install the Motor Block on the unit.



### 5-4. REPLACEMENT OF THE REEL TABLE TRANSFER BELT

**Replacement procedure:**

- (1) Remove the Reel Table Transfer Motor Block from the back side of the unit.
- (2) Remove the Reel Table Transfer Belt from the top of the unit, replace the belt with a new one.
- (3) Hook the belt to the Motor Pulley of the Reel Table Transfer Motor Block, install it in the unit.



## 5-5. REPLACEMENT OF THE MOTOR PLATE ASSEMBLY

. Replacement procedures for the take-up side and the supply side are the same.

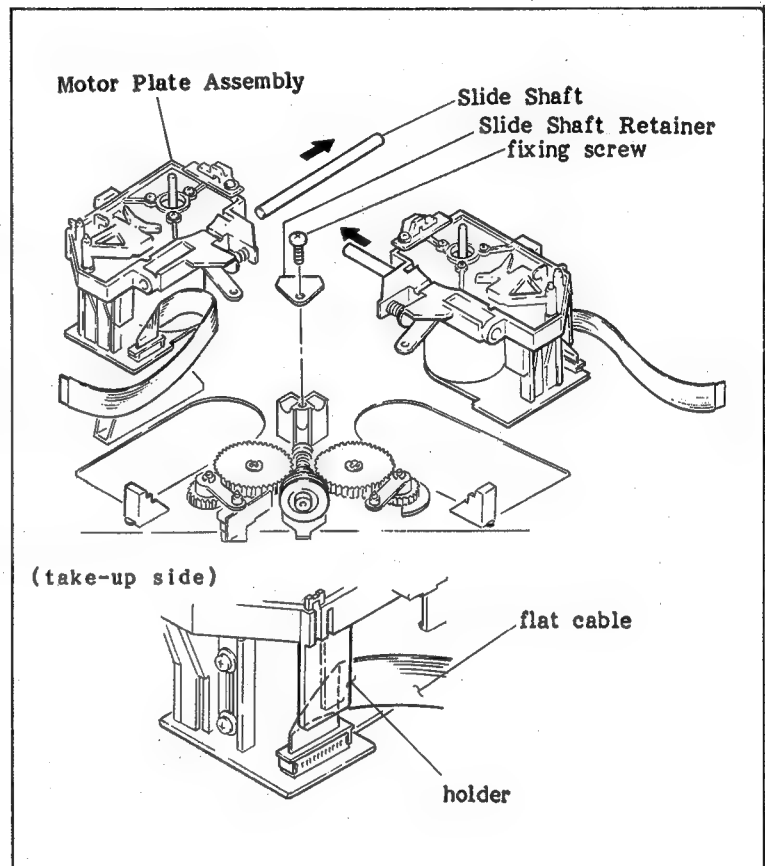
### Replacement procedure:

- (1) Remove the Reel Table as described in replacement procedures (1) to (4) of Section 5-2.
- (2) Remove the Slide Shaft Retainer.
- (3) Move the Slide Shaft in the direction of the arrow and remove it. Lift the Motor Plate Ass'y, disconnect the flat cable CN883 on the RM-40 Board.

- (4) Bend the flat cable as shown in the figure, and connect the flat cable to the RM-40 Board on the new Motor Plate Ass'y.

NOTE: Insert the flat cable into the holder as shown in the figure for only take-up side.

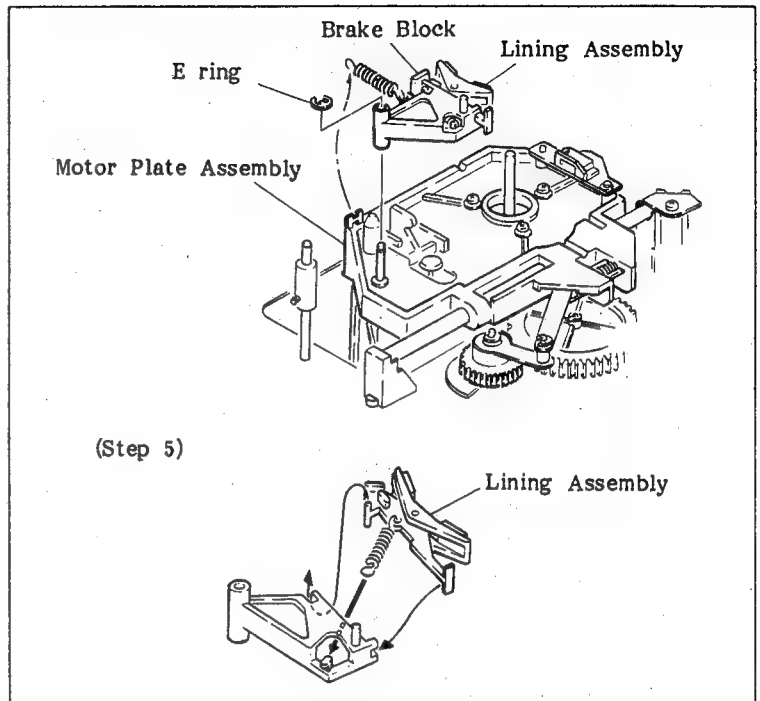
- (5) Clean the Slide Shaft with a cloth moistened with cleaning fluid.
- (6) Insert the Slide Shaft, and then install it in the unit.
- (7) Install the Slide Shaft Retainer.
- (8) Perform the adjustments in Section 5-21.



## 5-6. REPLACEMENT OF THE REEL TABLE BRAKE

### Replacement procedures:

- (1) Remove the Reel Table as described in replacement procedures (1) to (4) of Section 5-2.
- (2) Remove the E ring as shown in the figure.
- (3) Remove the spring on the Motor Plate Ass'y side.
- (4) Remove the Brake Block.
- (5) Remove the spring of the Brake Block as shown in the figure, then remove the Lining Ass'y.
- (6) Replace it with a new one, reassemble in the reverse order.
- (7) Perform the adjustments in Section 5-21.



## 5-7. REPLACEMENT OF THE UPPER DRUM

- . The Rotary Video Heads cannot be replaced individually, the entire Upper Drum Assembly must be replaced when any one of these heads fails.

**Tools:** Drum eccentricity gauge (1)  
Drum eccentricity gauge (2)  
Drum eccentricity gauge (3)  
Drum eccentricity gauge (5)  
Cleaning fluid  
Cleaning piece

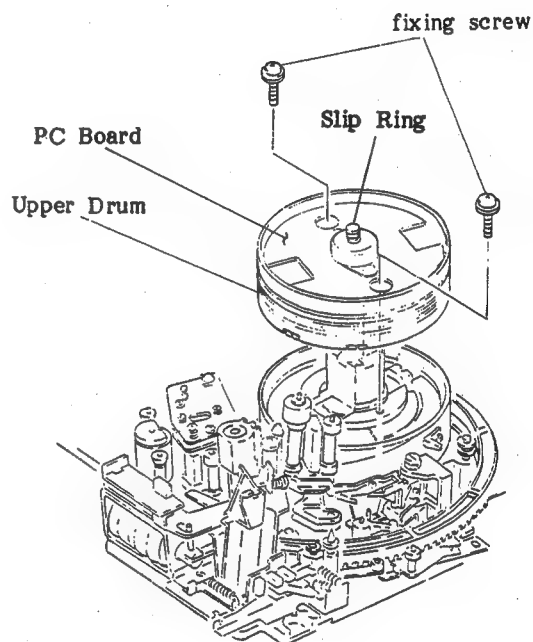
### Replacement procedure:

- (1) Disconnect connector CN111 on the SR-42 Board of the Brush Block.
- (2) Remove the Brush Cover and the brush of the Slip Ring Block.
- (3) Unsolder the ten leads on the printed circuit board of the Upper Drum.
- (4) Remove the two fixing screws of the Upper Drum Ass'y, and then remove the Upper Drum Ass'y from the unit.
- (5) Clean the contacting surfaces of the flange and new Upper Drum Ass'y with a cloth moistened with cleaning fluid.

NOTE: If there is a spacer between the drum and the flange, it should be remain in place, or be reinstalled in the same place with the new Upper Drum Ass'y. The spacer is 0.01 mm, 0.03 mm, or 0.1 mm.

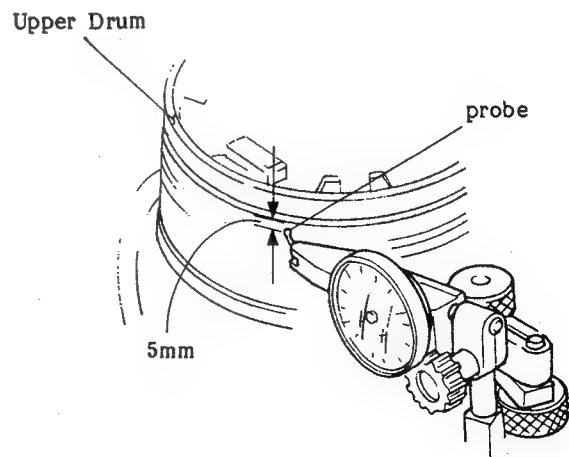
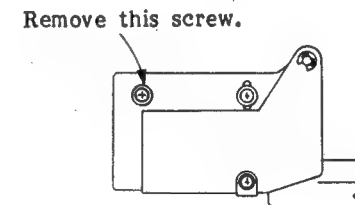
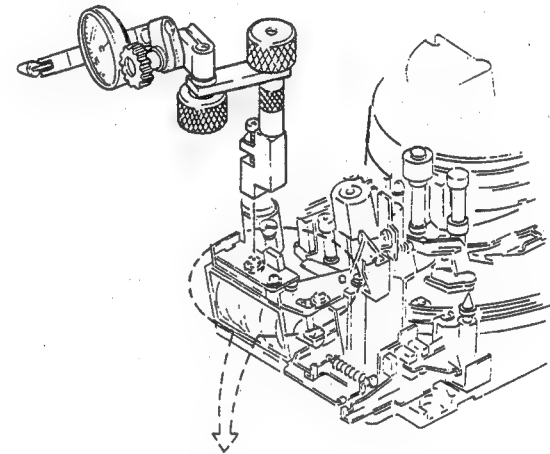
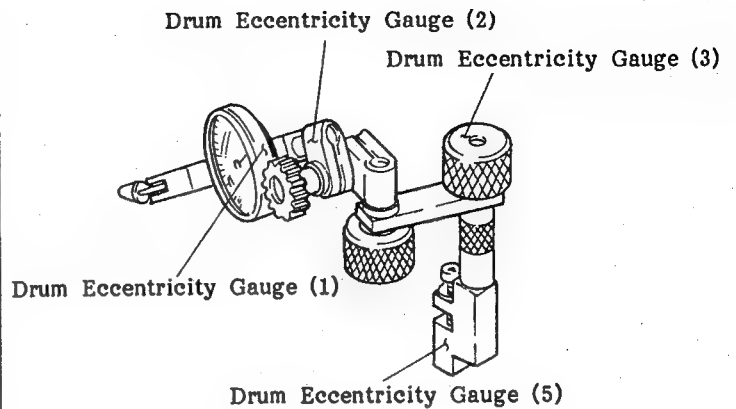
- (6) Place the marked "A" on the printed circuit board with the marked "A" of the Lower Drum Ass'y. Thread snugly with two fixing screws but do not tighten.

### <Removing the Connector>



#### Adjustment procedure:

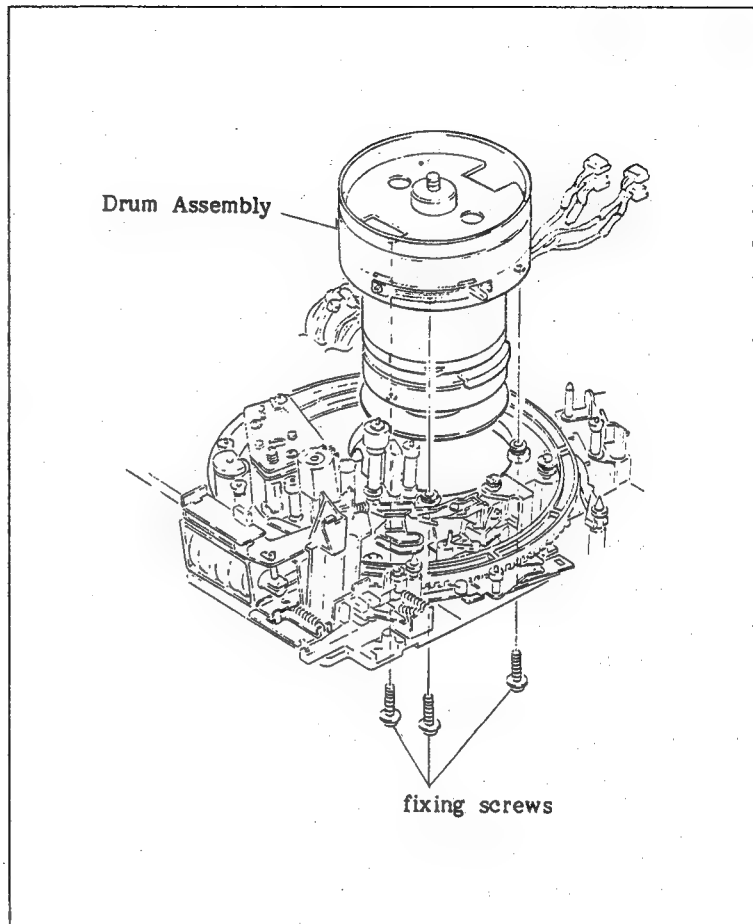
- (1) Assemble the drum eccentricity gauges (1), (2), (3), and (5) as shown in the figure. Remove the screws shown in the figure and mount the assembled gauges in the hole so that the tip probe is positioned about 5 mm from the overmost circumference top edge of the Upper Drum.
- (2) Turn the Upper Drum slowly clockwise direction and confirm that the pointer deflection of the gauge is within 5 microns during one complete turn of the Upper Drum. If this specification is satisfied, proceed to Step (5). If it is not, perform then continue with the remaining Steps.
- (3) Tap the top outer circumference of the Upper Drum with a nylon hammer or a screwdriver handle so that the gauge deflection remains within 5 microns.
- (4) After adjustments, tighten the two fixing screws that secure the Upper Drum alternately and gradually using a tightening torque of 8 kg. cm.
- (5) After the screws are tightened, check again that the eccentricity of the Upper Drum is within 5 microns.
- (6) Solder the ten leads.
- (7) Install the brush and Brush Cover, and connect the connectors.
- (8) Perform the adjustments in Section 5-21.



## 5-8. REPLACEMENT OF THE DRUM ASSEMBLY

### Replacement procedure:

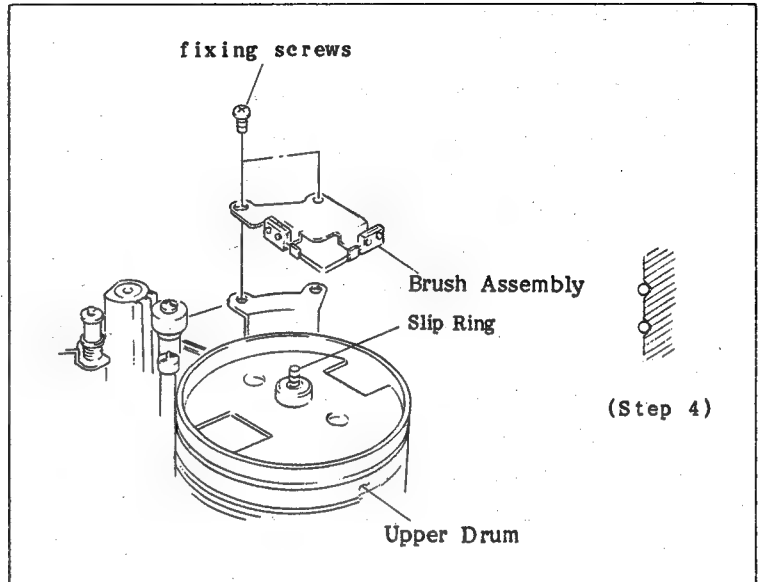
- (1) Disconnect connector CN111 on the SR-42 Board of the Brush Block.
- (2) Remove the Brush Cover and the brush of the Slip Ring Block.
- (3) Put on the unit right side down.
- (4) Disconnect the connectors CN651 and CN652 on the SVD-2 Board.
- (5) Disconnect the connectors CN151 and CN152 on the DM-74 Board.
- (6) Remove the three fixing screws on the back of the unit, and then remove the defective drum.
- (7) Install the Drum Ass'y on the base. Tighten the fixing screws while turning the Drum Ass'y in a counterclockwise direction as viewed from top of the unit.
- (8) Connect the connectors of the drum harness.
- (9) Install the brush and Brush Cover, and connect the connectors on the SR-42 Board.
- (10) Perform the adjustments in Section 5-21.



## 5-9. REPLACEMENT OF THE BRUSH ASSEMBLY

### Replacement procedure:

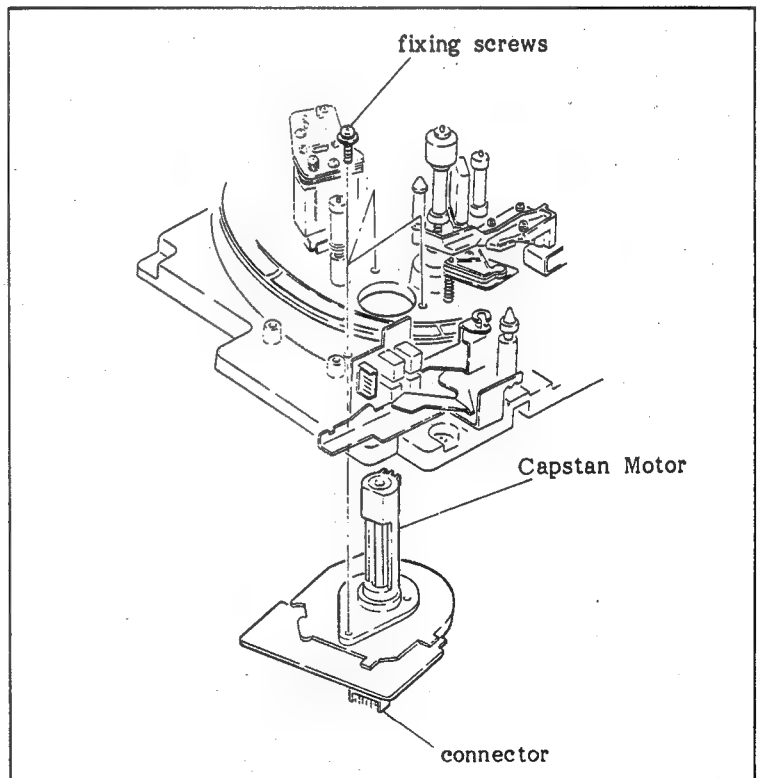
- (1) Remove the fixing screw, remove the Brush Cover.
- (2) Disconnect connector CN111 on the SR-42 Board.
- (3) Remove the two fixing screws, replace the Brush Ass'y with a new one.
- (4) Check that the Brush touches the Slip Ring as shown in the figure.
- (5) Install the Brush Cover and connectors.
- (6) Perform the adjustments in Section 5-21.



## 5-10. REPLACEMENT OF THE CAPSTAN MOTOR

### Replacement procedure:

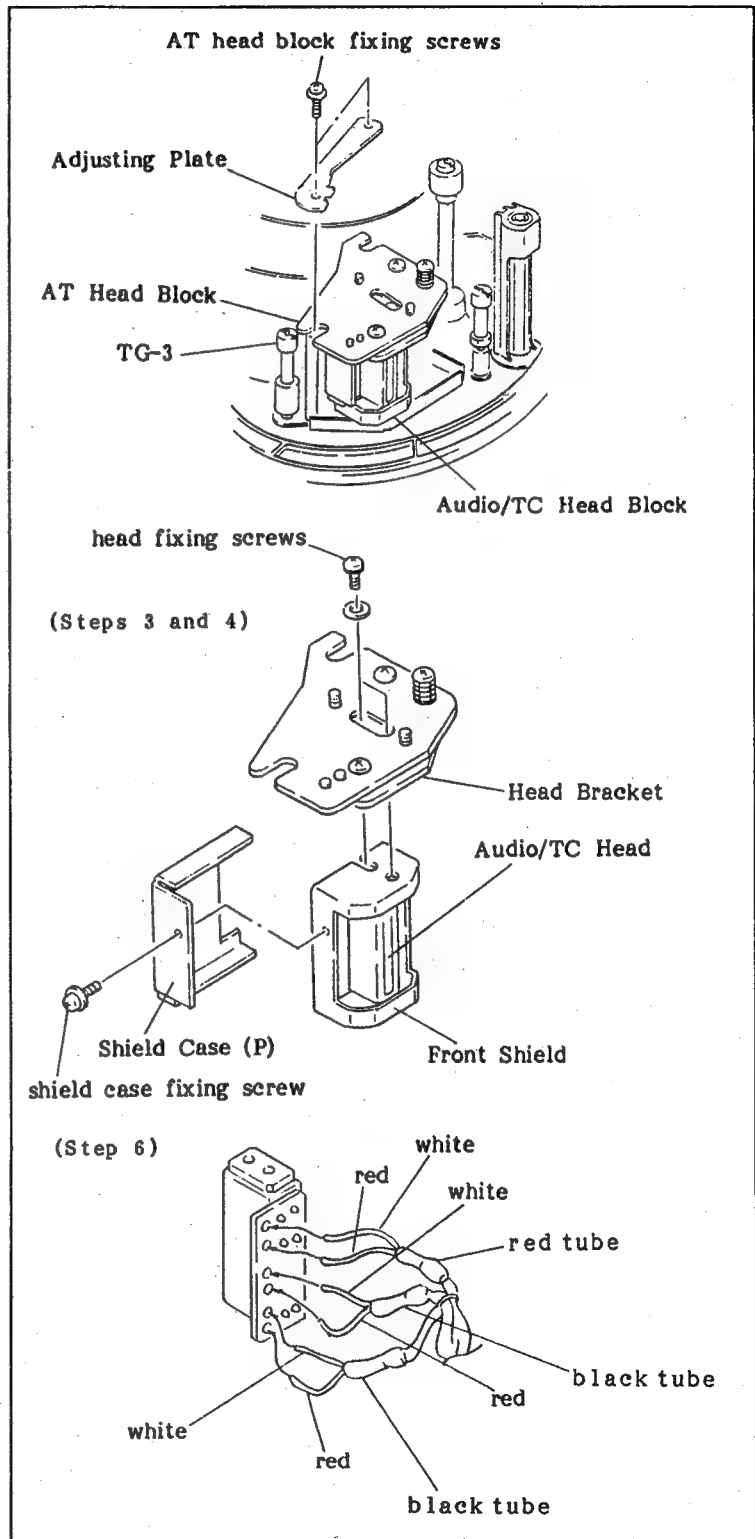
- (1) Remove the two fixing screws of the Pinch Solenoid Block, and then remove the Pinch Solenoid Block from the unit.
- (2) Disconnect connector CN1 of the Capstan Motor on the back of the unit.
- (3) Remove the three fixing screws (a fixing screw is under the Pinch Solenoid Block); remove the Capstan Motor from the unit.
- (4) Install the new Capstan Motor. Tighten the three fixing screws while turning the motor in the clockwise direction, as viewed from top of the unit.
- (5) Install the Pinch Solenoid Block in the unit.
- (6) Perform the adjustments in Section 5-21.



## 5-11. REPLACEMENT OF THE AUDIO/TC HEAD

### Replacement procedure:

- (1) Remove the two fixing screws of the Audio/TC Head Block, then remove the Audio/TC Head Block from the unit.
- (2) Unsolder the six leads on the PC Boards of the Audio/TC Head.
- (3) Remove the two fixing screws as shown in the figure, then remove the Audio/TC Head and Shield Case from the Head Bracket.
- (4) Remove the fixing screw of the Shield Case (P). Remove the Shield Case (P) from the Audio/TC Head Block.
- (5) Replace the Audio/TC Head with a new one.
- (6) Install the Audio/TC Head and Front Shield Plate on the Bracket, then attach the Shield Case (P).
- (7) Install the Audio/TC head in the reverse order of Steps (1) and (2).
- (8) After replacement, perform the adjustments in Section 5-21.



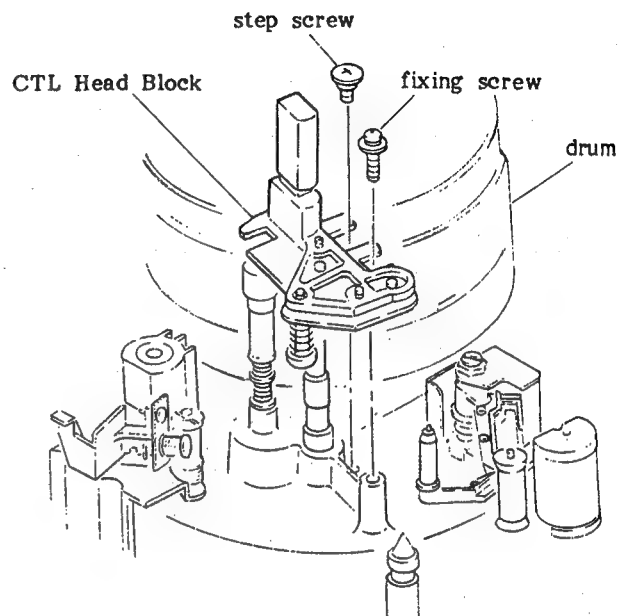


## 5-12. REPLACEMENT OF THE CTL HEAD

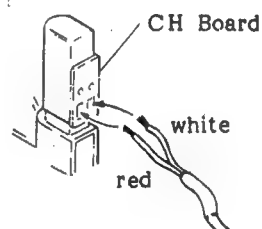
**Mode:** Unthreading end mode

### Replacement procedure:

- (1) Remove the fixing screw and step screw as shown in the figure, remove the CTL Head Block from the unit.
- (2) Unsolder the two leads on the CH Board of the CTL Head.
- (3) Remove the two fixing screws from the CTL Head.
- (4) Replace the CTL Head with a new one.  
NOTE: Install the new CTL Head so that the \* marked portion of the CTL Head is parallel with the \*\* marked portion of the CTL Head Base.
- (5) Install the CTL Head in the reverse order of Steps (1) to (3).
- (6) After replacement, perform the adjustment in Section 5-21.

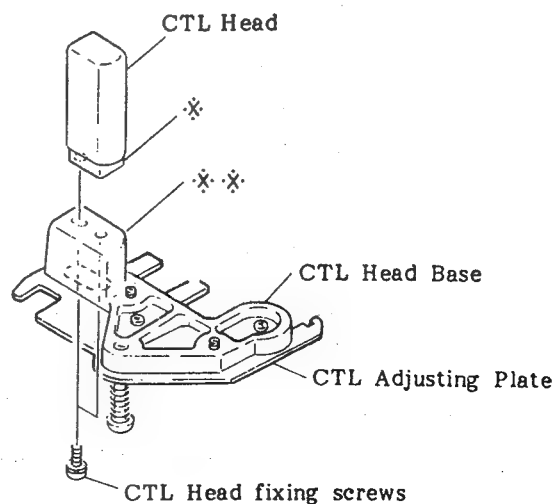


(Step 2)



lead	CH board
red	CX
white	CY

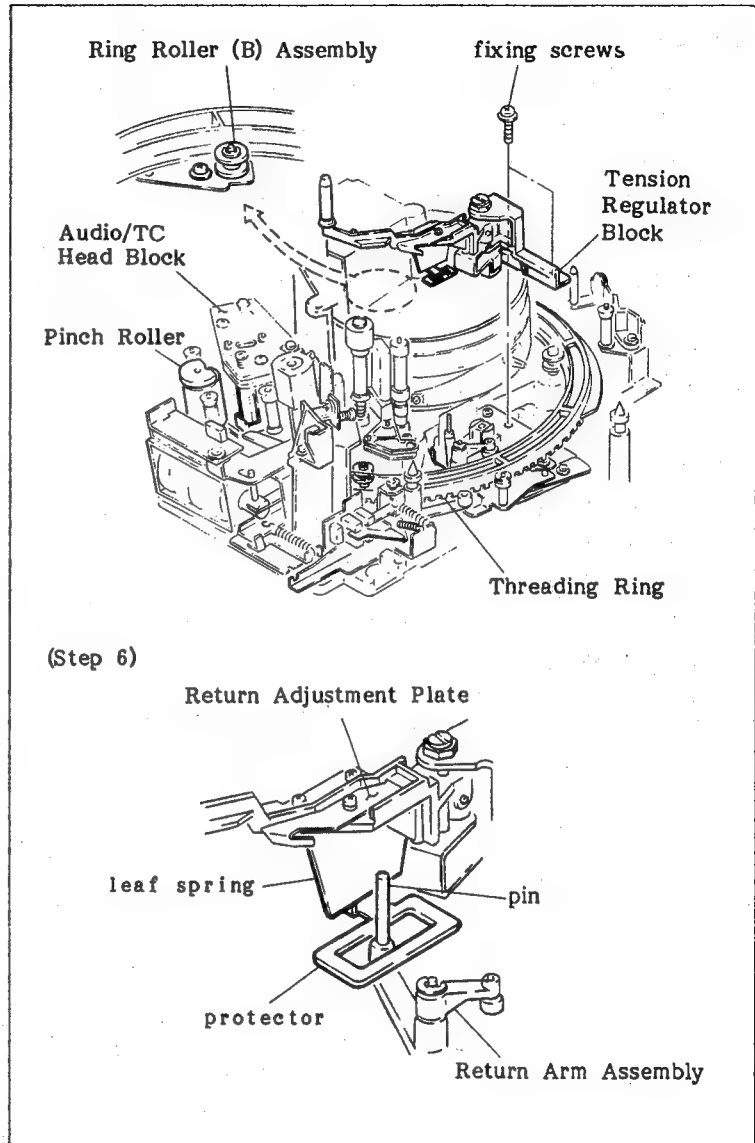
(Step 4)



### 5-13. REPLACEMENT OF THE TENSION REGULATOR BLOCK

#### Replacement procedure:

- (1) Loosen the two fixing screws of the Gear Box, release the engagement of the Drive Gear and the Threading Ring.
- (2) Turn the Threading Ring so that the Pinch Roller is placed in front of the Audio/TC Head Block.
- (3) Loosen the fixing screw of the Ring Roller (B), release the hold of the Threading Ring.
- (4) Lightly lift the Threading Ring in front of the Supply Reel Table. Remove the two fixing screws of the Tension Regulator Block as shown in the figure.
- (5) Remove the Return Adjustment Plate, protector, and leaf spring from the old Tension Regulator Block. Install them in the new one.
- (6) Install the Tension Regulator Block so that the pin of the Return Arm Ass'y is placed into the hole of the protector as shown in the figure.
- (7) Tighten the Ring Roller (B) to the unit. After replacement, perform the adjustments in Section 5-21.



#### 5-14. REPLACEMENT OF THE SUPPLY TENSION ROLLER

**Tool:** Hex. key (across flat has 0.9 mm)

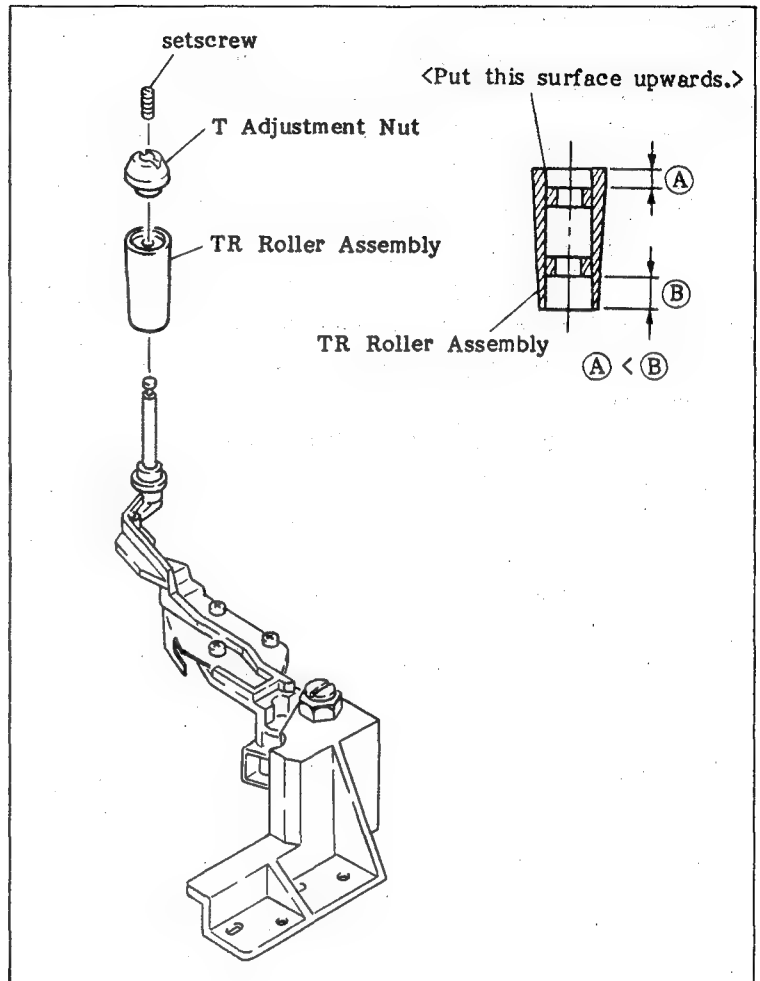
**Replacement procedure:**

- (1) Remove the setscrew as shown in the figure.
- (2) Turn the T Adjustment Nut, then remove it.

- (3) Remove the TR Roller Ass'y, replace it with a new one.

**NOTE:** Before assembling the TR Roller Ass'y, put the TR Roller Ass'y in the direction as shown in the figure.

- (4) After replacement, perform the adjustments in Section 5-21.

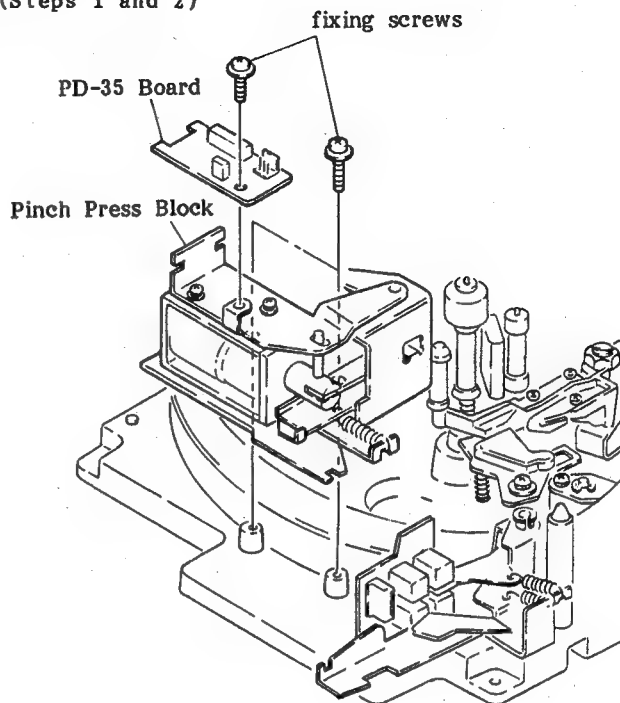


## 5-15. REPLACEMENT OF THE PINCH SOLENOID

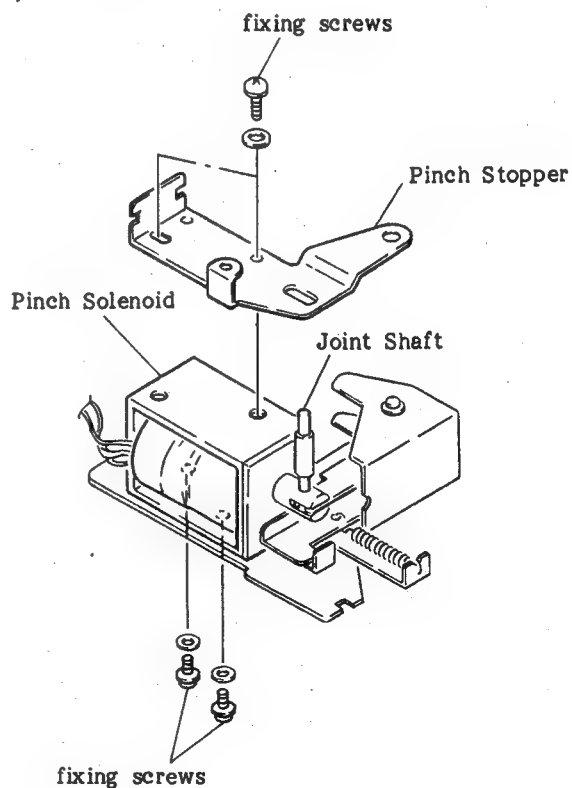
### Replacement procedure:

- (1) Remove the PD-35 Board from the Pinch Press Block.
- (2) Remove the Pinch Press Block from the unit.
- (3) Remove the two fixing screws as shown in the figure, remove the Pinch Stopper.
- (4) Remove the Joint Shaft.
- (5) Remove the two fixing screws. Remove the Pinch Solenoid, replace it with a new one.
- (6) After replacement, perform the adjustments in Section 5-21.

(Steps 1 and 2)



(Steps 3, 4 and 5)

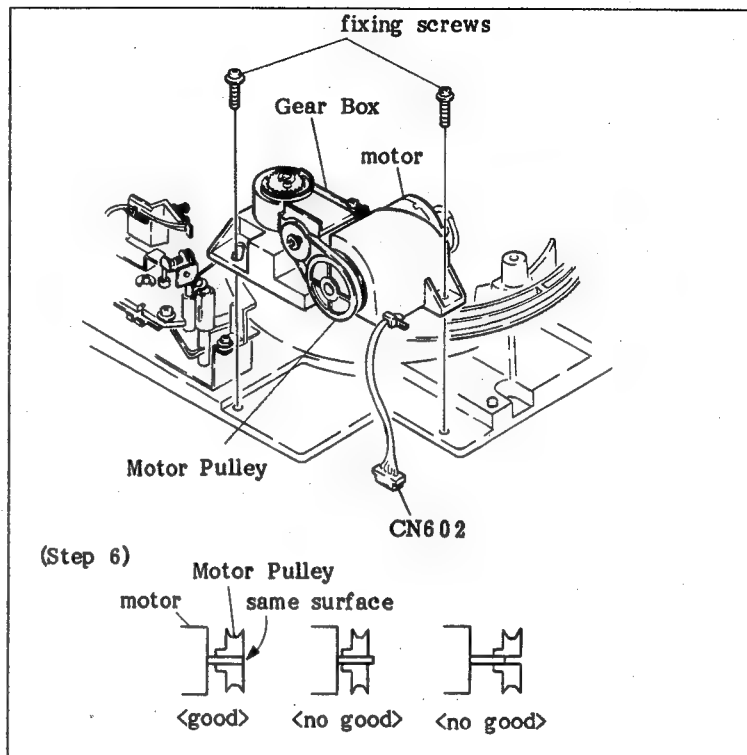


## 5-16. REPLACEMENT OF THE THREADING MOTOR

**Tools:** Hex. key (across flat has 1.27 mm)

### Replacement procedure:

- (1) Disconnect connector CN602 on the CP-123 Board.
- (2) Remove the two fixing screws, then remove the Gear Box from the unit.
- (3) Remove the fixing screw of the Motor Pulley with a hex. key. Remove the pulley and the belt from the Gear Box.
- (4) Unsolder the two leads of the motor.
- (5) Replace the motor with a new one. Solder the gray lead to the "+" terminal and the black lead to the other terminal.
- (6) Install the Motor Pulley so that the end of the Motor Shaft and the Motor Pulley are as shown in the figure.
- (7) Install the Gear Box into the unit. Connect connector CN602 on the CP-123 Board.
- (8) Perform the adjustments in Section 5-21.

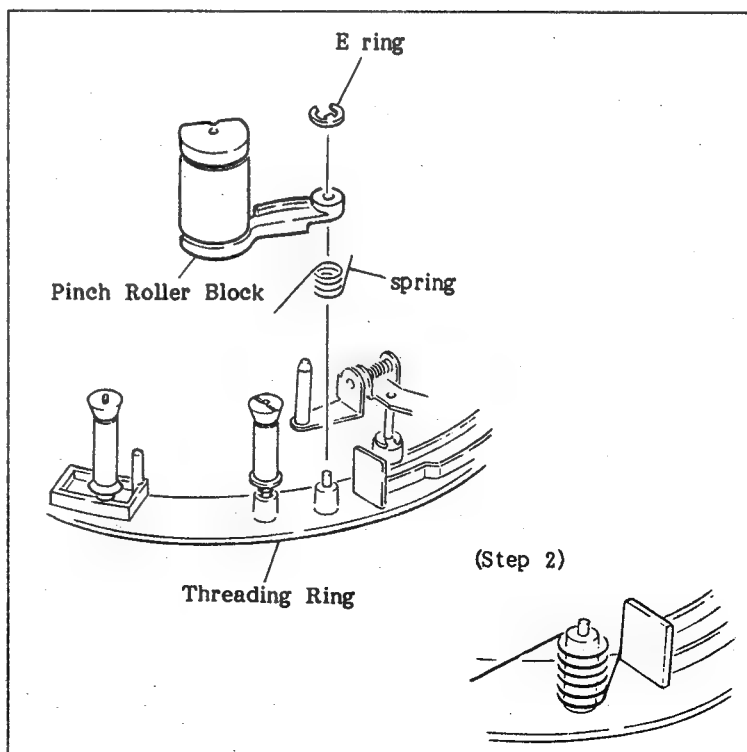


## 5-17. REPLACEMENT OF THE PINCH ROLLER

**Mode:** Unthread end mode (Turn the power OFF.)  
Turn the Motor Pulley of the Gear Box about 5 turns so that the Threading Ring turns a little in the threading direction.

### Replacement procedure:

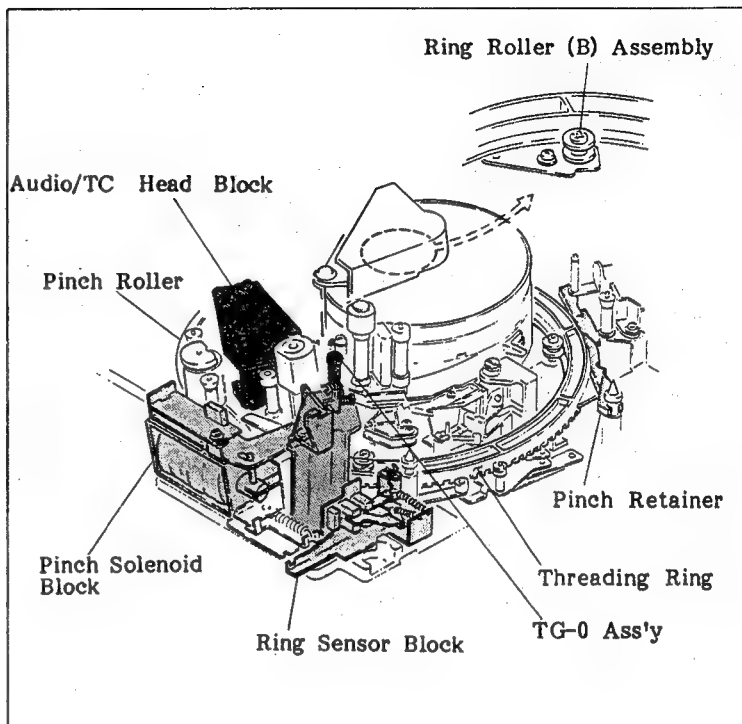
- (1) Remove the E ring on the Threading Ring as shown in the figure, remove the Pinch Roller Block.
- (2) Hook the spring as shown in the figure, install the new Pinch Roller on the Threading Ring.
- (3) After replacement, perform the adjustments in Section 5-21.



## 5-18. REPLACEMENT OF THE THREADING RING

### Replacement procedure:

- (1) Turn the Gear Box Pulley by hand so that the Pinch Roller is in front of the Audio/TC Head.
- (2) Remove the Pinch Retainer, Audio/TC Head Block, Pinch Solenoid Block, the Ring Sensor Block and TG-0 Ass'y.
- (3) Disconnect the connector on the Slip Ring Block.
- (4) Loosen the fixing screws of the Gear Box, release the engagement of the Drive Gear and the Threading Ring.
- (5) Loosen the fixing screw of the Ring Roller (B), release the hold of the Threading Ring.
- (6) Remove the Threading Ring, replace it with a new one.
- (7) Install the Ring Sensor while turning in the counterclockwise direction.
- (8) Install the Pinch Solenoid Block, Audio/TC Head Block, and TG-0 Ass'y.
- (9) Insert the connector on the Slip Ring Block.
- (10) After replacement, perform the adjustments in Section 5-21.

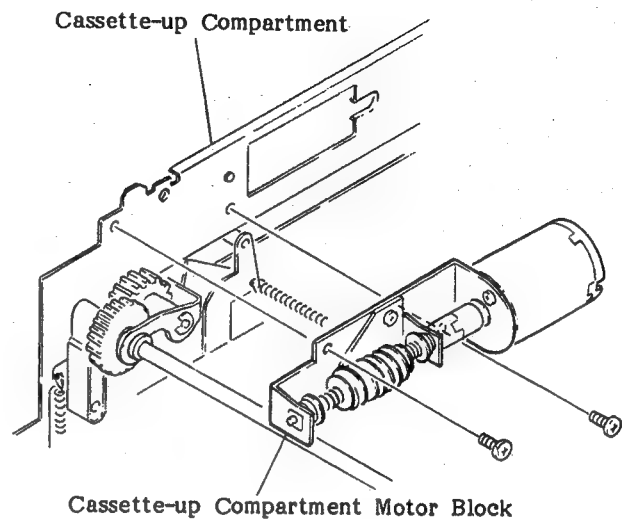


## 5-19. REPLACEMENT OF THE CASSETTE-UP COMPARTMENT WORM GEAR

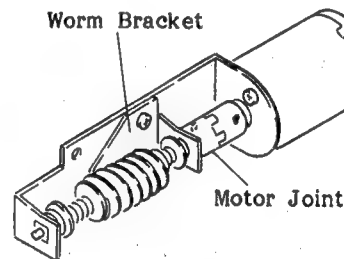
**Tool:** Hex. key (across flat has 1.27 mm)  
 DC power (12 V)  
 Wire clearance gauge

### Replacement procedure:

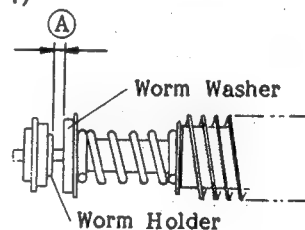
- (1) Remove the Cassette-up Compartment from the unit.
- (2) Disconnect the connector on the CCM-2 Board of the Cassette-up Compartment Motor.
- (3) Remove the Cassette-up Compartment Motor Block from the Cassette-up Compartment.
- (4) Loosen the fixing screw of the Motor Joint on the Worm Gear Shaft side.
- (5) Remove the motor.
- (6) Remove the Worm Bracket, replace the defective parts with a new one.
- (7) Install the Worm Bracket in the Cassette-up Compartment Motor Block so that the clearance between the Worm Holder and the Worm Washer meets the required specification.
- (8) Insert the Motor Joint into the Worm Gear Shaft, then install it while pushing the Motor Joint in the direction of the Bracket.
- (9) Insert the motor into the Bracket, engaged at two joints.
- (10) Secure the motor to the Bracket.
- (11) Remove the Motor Joint in the motor side so that the clearance between the two joints meets the required specification.
- (12) Supply the 12 Vdc power to the connector on the CCM-2 Board of the Cassette-up Compartment Motor.



(Step 4)

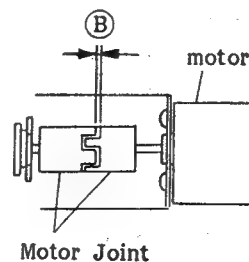


(Step 7)



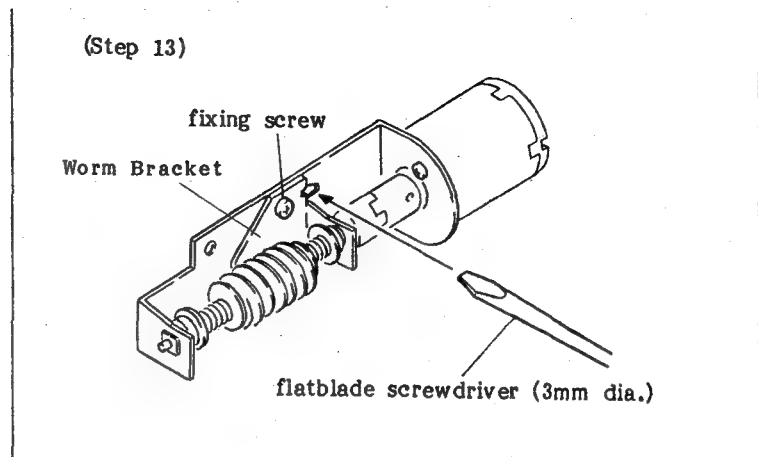
Spec.:  
 $0.1\text{mm} \leq \textcircled{A} \leq 0.3\text{mm}$

(Step 11)



Spec.:  
 $0.5\text{mm} \leq \textcircled{B} \leq 0.8\text{mm}$

- (13) Loosen the worm mounting screw about 1/4 turn. Adjust the position of the Worm Bracket with a flatblade screwdriver (3 mm dia.) so that the current reading is minimized.
- (14) Install the Cassette-up Compartment Motor Block to the Cassette-up Compartment Ass'y, connect the connector to the Cassette-up Compartment Motor.



## 5-20. REPLACEMENT OF THE CASSETTE-UP COMPARTMENT MOTOR

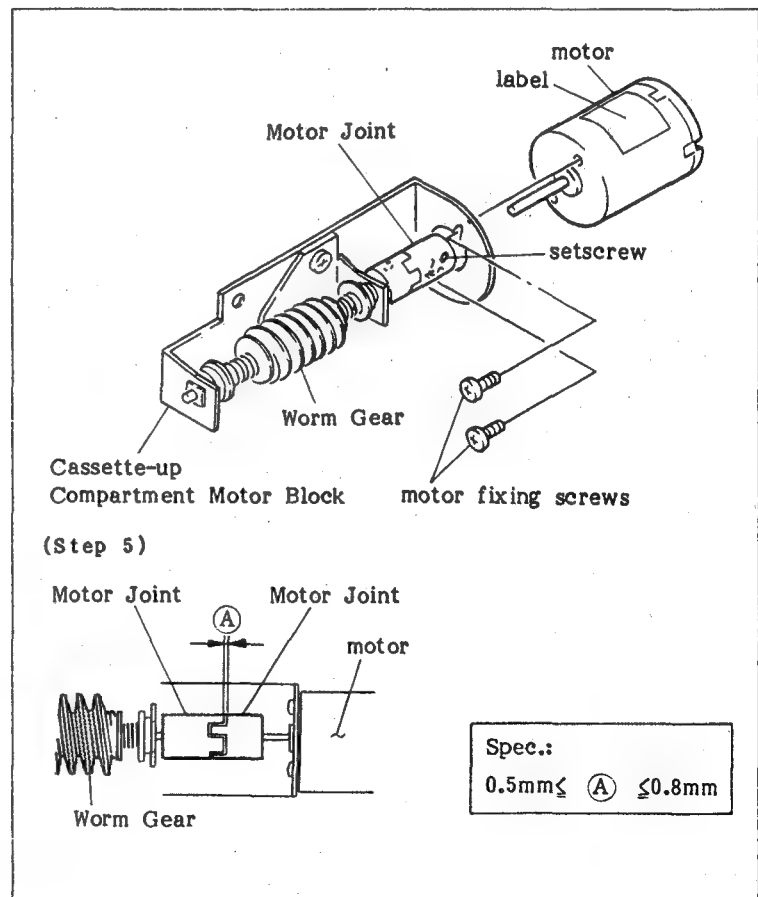
**Tool:** Hex. key (across flat has 1.27 mm)  
DC power (12 V)  
Wire clearance gauge

### Replacement procedure:

- (1) Disconnect the connector on the CCM-2 Board of the Cassette-up Compartment Motor.
- (2) Remove the Cassette-up Compartment Motor Block from the Cassette-up Compartment.
- (3) Loosen the fixing screws of the motor, and then remove the motor.
- (4) Thread the Motor Joint snugly but do not tighten to the shaft of the new motor, then insert the Motor Joint into the bracket.

**NOTE:** Install it so that the label on the Motor is located as shown in the figure.

- (5) Adjust the position of the Motor Joint on the motor side so that the clearance between the Motor Joints on the Worm Gear side and the motor side meets the required specification.
- (6) Install the Cassette-up Compartment Motor Block to the Cassette-up Compartment.





## **5-21. ITEMS TO BE ADJUSTED AFTER MAIN PARTS REPLACEMENT**

. Numbers in parenthesis refer to Section Nos.

### **Replacement of the Reel Motor**

Reel Motor Shaft Slantness Adjustment (6-1-3) —→ Reel Table Height Adjustment (6-1-4) —→ Reel Rotation Detector Block Position Adjustment (6-1-5) —→ Reel Table Brake Clearance Adjustment (6-2-1) —→ Supply Brake Torque Adjustment (7-1-1) or Take-up Brake Torque Adjustment (7-1-2) —→ Reel Torque Adjustment (7-2) —→ Video Tracking Adjustment (Check) (8-1)

### **Replacement of the Reel Table**

Reel Table Height Adjustment (6-1-4) —→ Reel Rotation Detector Block Position Adjustment (6-1-5) —→ Reel Table Brake Clearance Adjustment (6-2-1) —→ Supply Brake Torque Adjustment (7-1-1) or Take-up Brake Torque Adjustment (7-1-2) —→ Video Tracking Adjustment (Check) (8-1)

### **Replacement of the Motor Plate Assembly**

Cassette Holder Height Adjustment (L) (6-1-1) —→ Cassette Holder Height Adjustment (S) (6-1-2) —→ Reel Table Height Adjustment (6-1-4) —→ Reel Rotation Detector Block Position Adjustment (6-1-5) —→ Reel Table Brake Clearance Adjustment (6-2-1) —→ Reel Table Brake Release Adjustment (6-2-2) —→ Supply Brake Torque Adjustment (7-1-1) —→ Take-up Brake Torque Adjustment (7-1-2) —→ Reel Torque Adjustment (7-2) —→ Video Tracking Adjustment (Check) (8-1)

### **Replacement of the Reel Table Brake**

Reel Table Brake Clearance Adjustment (6-2-1) —→ Reel Table Brake Release Adjustment (6-2-2) —→ Supply Brake Torque Adjustment (7-1-1) or Take-up Brake Torque Adjustment (7-1-2)

### **Replacement of the Upper Drum**

Slip Ring Block Brush Position Adjustment (8-5) —→ Video Tracking Adjustment (8-1) —→ CTL Head Position Adjustment (8-3-3) —→ Audio/TC Head Position Adjustment (8-2-5) —→ PB Head Y Switching Position Adjustment (10) —→ PB Head C Switching Position Adjustment (10) —→ Video System Adjustment

### **Replacement of the Drum Assembly**

Slip Ring Block Brush Position Adjustment (8-5) —→ Video Tracking Adjustment (8-1) (Adjust as described in "Tracking Adjustment".) —→ CTL Head Position Adjustment (8-3-3) —→ Audio/TC Head Position Adjustment (8-2-5) —→ PB Head Y Switching Position Adjustment (10) —→ PB Head C Switching Position Adjustment (10) —→ Video System Adjustment

#### **Replacement of the Brush Assembly**

Slip Ring Block Brush Position Adjustment (8-5)

#### **Replacement of the Audio/TC Head Block**

Audio/TC Head Zenith Adjustment (8-2-2) → Audio/TC Head Height Adjustment (8-2-1) → Audio/TC Head Azimuth Adjustment (8-2-3) → Audio/TC Head Phase Adjustment (8-2-4) → Video Tracking Adjustment (Check) (8-1) → Audio/TC Head Position Adjustment (8-2-5) → Audio System Adjustment

#### **Replacement of the CTL Head**

CTL Head Azimuth/Zenith Adjustment (8-3-2) → CTL Head Height Adjustment (8-3-1) → Video Tracking Adjustment (8-1) → CTL Head Position Adjustment (8-3-3) → Audio/TC Head Position Adjustment (8-2-5)

#### **Replacement of the Tension Regulator Block**

Threading Ring Rotation Adjustment (6-4) → Gear Box position Adjustment (6-5) → Pinch Roller Press Block Position Adjustment (6-6) → Tension Regulator Arm Position Adjustment (6-3-1) → Tension Regulator Arm Slantness Adjustment (6-3-2) → Tension Sensor Position Adjustment (6-7) → Tension Sensor Sensitivity Adjustment (6-8) → Video Tracking Adjustment (8-1)

#### **Replacement of the S Tension Roller**

Video Tracking Adjustment (8-1)

#### **Replacement of the Pinch Solenoid**

Pinch Roller Press Block Position Adjustment (6-6)

#### **Replacement of the Capstan Motor**

Pinch Roller Press Block Position Adjustment (6-6) → Servo System Adjustment → Video Tracking Adjustment (8-1)

#### **Replacement of the Threading Motor**

Gear Box Position Adjustment (6-5)

#### **Replacement of the Pinch Roller**

Pinch Roller Press Block Position Adjustment (6-6) → Video Tracking Adjustment (8-1)

### **Replacement of the Threading Ring**

Threading Rotation Adjustment (6-4) —→ Gear Box Position Adjustment  
(6-5) —→ Pinch Roller Press Block Position Adjustment (6-6) —→ Audio/TC  
Head Zenith Adjustment (8-2-2) —→ Audio/TC Head Height Adjustment  
(8-2-1) —→ Audio/TC Head Azimuth Adjustment (8-2-3) —→ Audio/TC  
Head Phase Adjustment (8-2-4) —→ Position Adjustment (8-2-5) —→ Video  
Tracking Adjustment (8-1)



## SECTION 6

### LINK AND DRIVE SYSTEM ALIGNMENT

#### ALIGNMENT INFORMATION

#### MODES

The following procedures are described without installing the Cassette-up Compartment.

##### How to put the unit into the threading end mode

- (1) Turn ON the POWER.
- (2) Press any function button except EJECT. The threading ring rotates counterclockwise. (This mode is called threading mode.)
- (3) The threading ring rotation is stopped, then the unit enters the threading end mode.

##### How to put the unit into the unthreading end mode

- (1) Press the EJECT button in the threading end mode of the unit. The threading ring rotates clockwise. (This mode is called unthreading mode.)
- (2) The threading ring rotation is stopped, then the unit enters the unthreading end mode.

##### How to put the unit into the PLAY mode without a cassette tape

- (1) Turn ON the POWER, and press the PLAY button. The threading ring rotates counterclockwise, and the threading ring rotation is stopped. Then the unit enters the PLAY mode. The pinch roller is pressed against the capstan shaft.

##### How to put the unit into STANDBY OFF mode

In the normal conditions, the unit enters the STANDBY OFF mode after one minute's Long Pause mode. But the Long Pause mode can set to one second by the following procedures:

- (1) Set the switches S3 and S4 on the SV-99 Board to " 0 ".
- (2) Press the STOP button. The unit enters the STANDBY OFF mode after one second's Long Pause mode. The drum rotation is stopped in the STANDBY OFF mode.

NOTE: After adjustment is completed, return the switches S3 and S4 on the SV-99 Board to the former positions (S3 to " 0 ", S4 to " 1 ").

##### How to put the unit into REV x1 mode

In the normal REVERSE SEARCH operation, put the unit into -3.5 times normal speed. But the REVERSE SEARCH speed can set to -1 times normal speed by the following procedures:

- (1) Short between TP11 and GND on the SV-99 Board with a short clip lead. At this time, "AJ000" is displayed on the Time Counter Display on the Front Panel.
- (2) Press the switch S1 on the SV-99 Board 15 times so that the "AJ015" is displayed on the Time Counter Display. In this state, press the REVERSE SEARCH button, the unit put into the REVx1 mode.

#### How to move the reel table without a cassette-up compartment and cassette tape

- (1) Turn ON the POWER.
- (2) Switch the S2 on the SY-121A Board to " L " or " S ", then the reel table moves to the designated position.  
L: L mode  
S: S mode

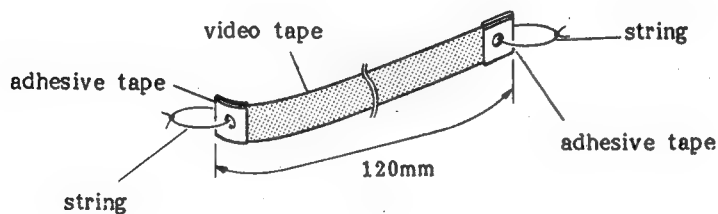
NOTE: If the switch S2 is turned to "L" or "S" in the cassette tape is installed stste, the unit will be damaged. Never turn this switch in this state.

#### How to stop the drum and the reel rotation in the unthreading end mode

- (1) Press the EJECT button, the unit enters the unthreading end mode. (In this state, the drum rotates.)
- (2) Press the EJECT button again, the drum and the reel rotation is stopped.

#### Creating the locally-produced-tape

- (1) Prepare a 12cm-long video tape (used out tape is acceptable).
- (2) As shown in the figure, attach adhesive tape across the video tape and make holes in it.
- (3) Make a 10cm-long loop of string through the holes.



## 6-1. REEL TABLE SYSTEM ADJUSTMENT

### 6-1-1. Cassette Holder Height Adjustment (L)

**Tool:** Cassette reference plate (L)  
Hex. key (across flat has 1.5 mm)  
Thickness gauge

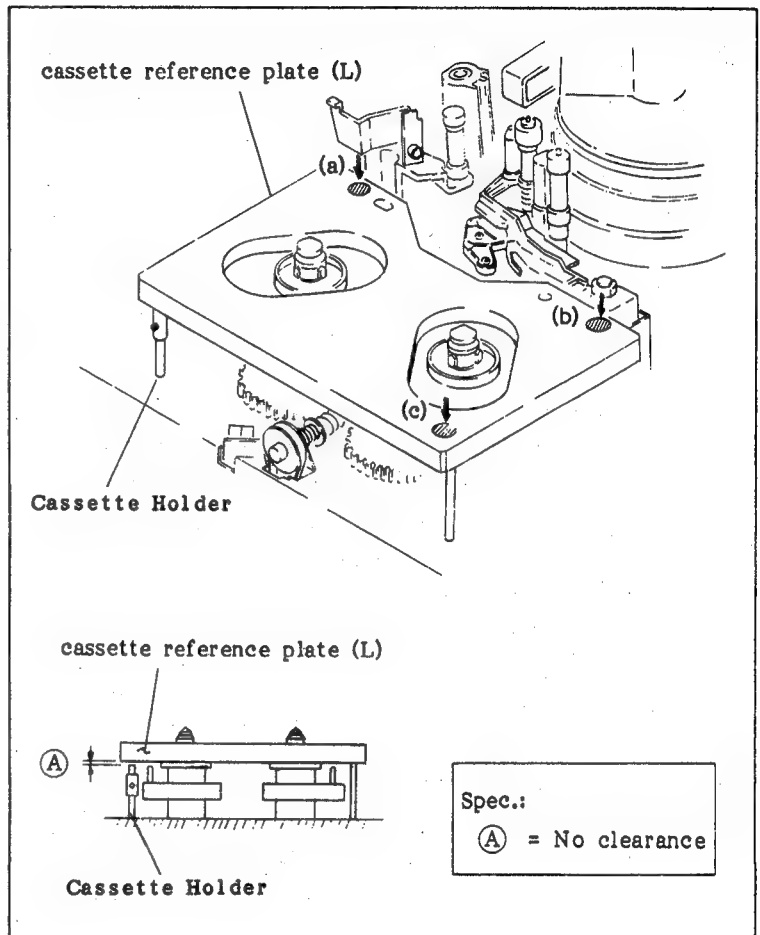
**Mode:** Unthreading end mode

**Check procedure:**

- (1) Install the cassette reference plate (L) at the position for the cassette.
- (2) While lightly pushing the cassette reference plate (L) marked (a), (b), and (c) toward the chassis, check that the clearance between the cassette reference plate (L) and the Cassette Holder meets the required specification.

**Adjustment procedure:**

- (1) Adjust the height of the Cassette Holder to meet the required specification.



## 6-1-2. Cassette Holder Height Adjustment (S)

. It is required that Section 6-1-1, Cassette Holder Height Adjustment (L) is completed before initiating this adjustment.

**Tool:** Cassette reference plate (L)  
Hex. key (across flat has 1,5 mm)  
Inspection mirror

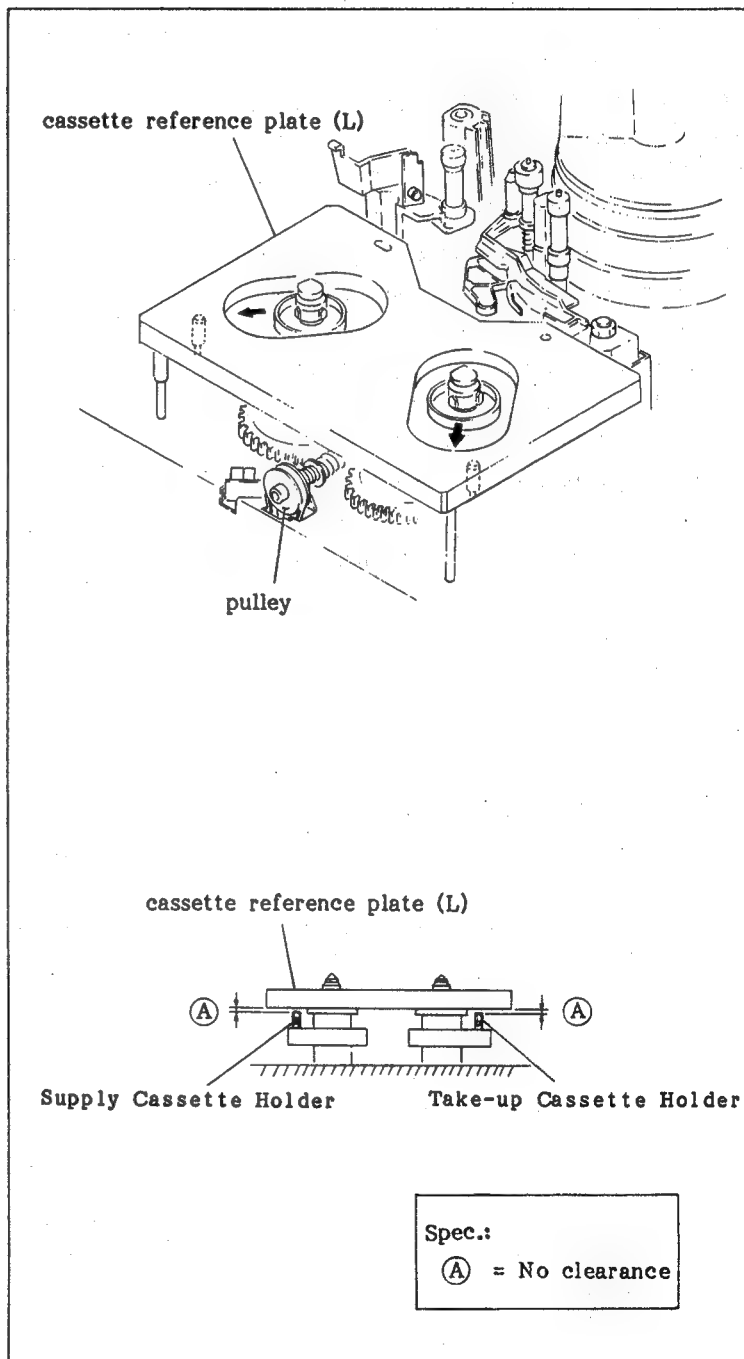
**Mode:** Unthreading end mode

### Check procedure:

- (1) Install the cassette reference plate (L) at the position for the cassette.
- (2) Turn the pulley by hand so that the Reel Table moves to the position as shown in the figure.
- (3) Insert the cassette reference plate (L) in the Take-up Motor Plate Ass'y, check that there is no clearance between the Cassette Holder for the small cassette and the cassette reference plate (L).
- (4) In the Supply Motor Plate Ass'y, check that there is no clearance between the Cassette Holder for the small cassette and the cassette reference plate (L).

### Adjustment procedure:

- (1) Adjust the height of the Cassette Holder so that there is no clearance between the cassette reference plate (L) and the Cassette Holder.





### 6-1-3. Reel Motor Shaft Slantness Adjustment

. This adjustment is usually not required. Proceed with the following steps only when the Reel Motor is replaced.

**Tool:** Cassette reference plate (L)  
Reel motor shaft slantness check jig  
Hex. key (across flat has 1.5 mm)  
Thickness gauge

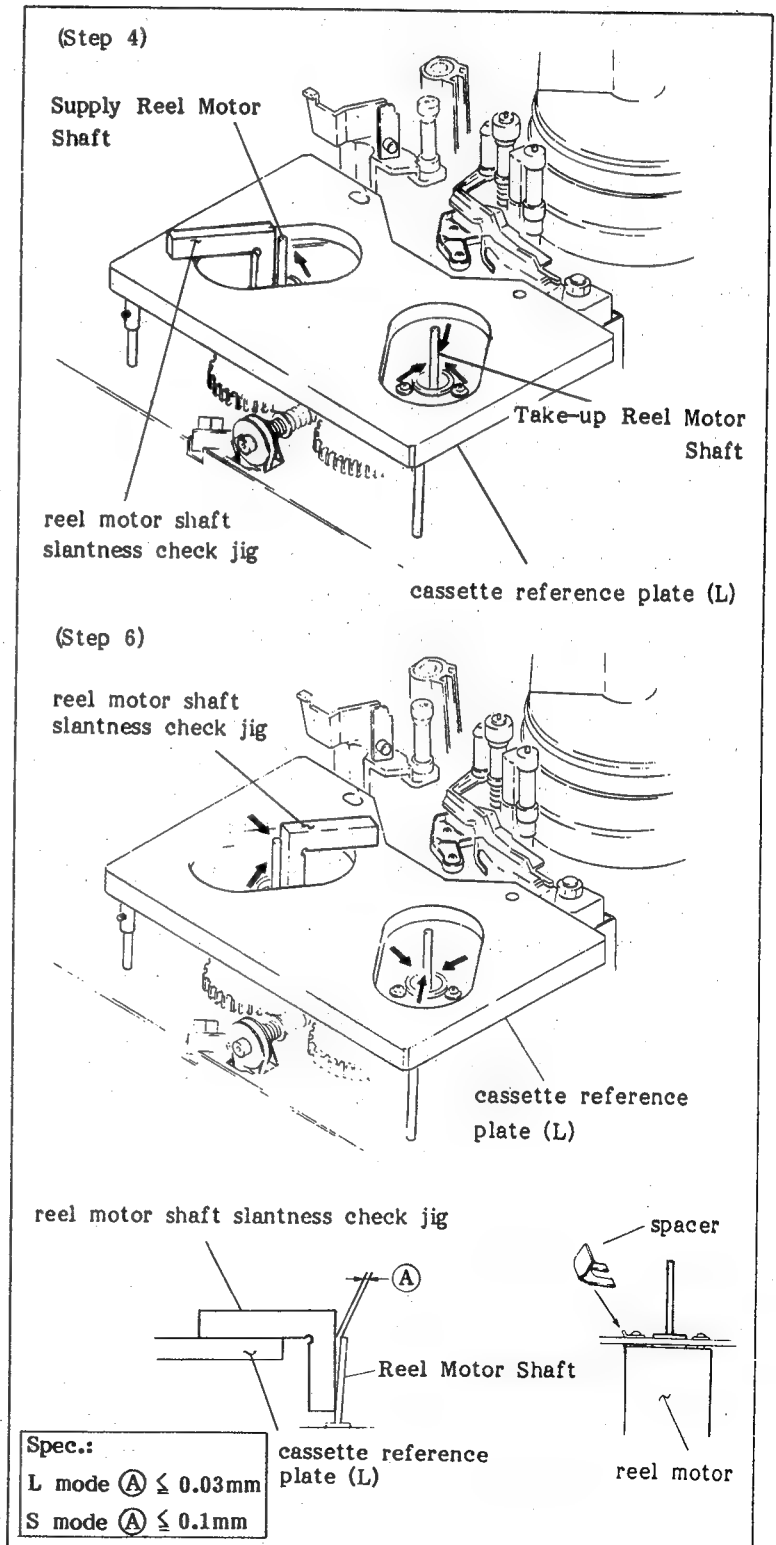
**Mode:** Unthreading end mode

#### Check procedure:

- (1) Put the Reel Block into the L mode.
- (2) Remove the Reel Table as described in replacement procedures (1) to (4) of Section 5-2, Replacement of the Reel Table. (Be careful not to lose the reel table height adjustment polyslider washer.)
- (3) Install the cassette reference plate (L) at the position for the cassette.
- (4) Check that the clearance between the check jig and the shaft meets the required specification, when the reel motor shaft slantness check jig is set on the reel motor shaft from three directions as shown in the figure.
- (5) Put the Reel Block into the S mode.
- (6) Perform as described in procedure (4) again.

#### Adjustment procedure:

- (1) Insert the reel motor spacer at the reel motor mounting screw as shown in the figure.
  - . Reel motor spacer:  
3-717-625-01
- (2) After adjustment, install the Reel Table and perform Section 6-1-4, Reel Table Height Adjustment.



#### 6-1-4. Reel Table Height Adjustment

- . This adjustment is usually not required. Proceed with the following steps when the Reel Motor or Reel Table is replaced.
- . Adjust the Supply Reel Table so that its position is 0.25 mm higher than the position adjusted by the reel table height gauge. Proper tape transport can be then obtained.

**Tool:** Cassette reference plate (L)  
Reel table height gauge  
Hex. key (across flat has 1.5 mm)

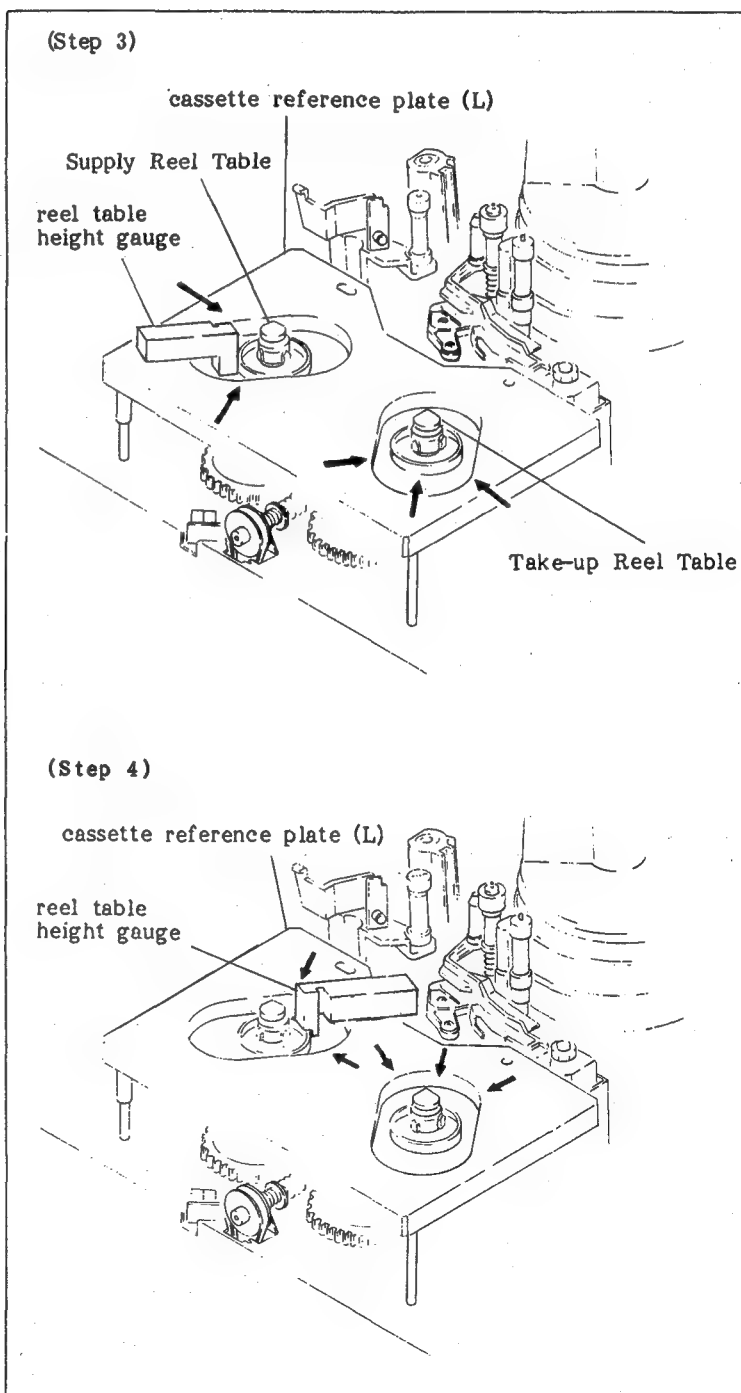
**Mode:** Unthreading end mode

##### Adjustment procedures:

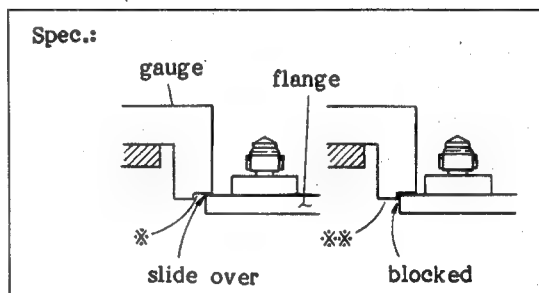
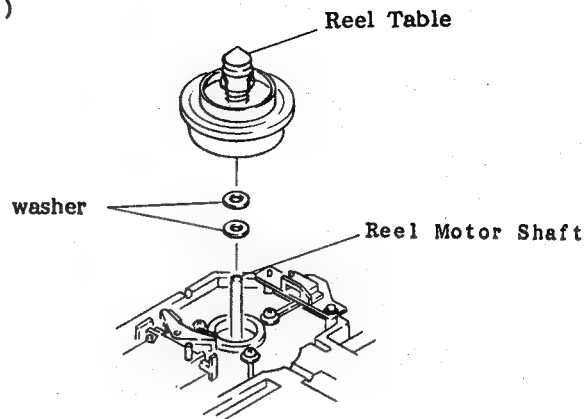
- (1) Put the Reel Block into the L mode.
- (2) Install the cassette reference plate (L) at the position for the cassette.
- (3) Move the reel table height gauge from three directions as shown in the figure. Adjust the height by changing the number of washers under the reel table so that the \* marked portion of the gauge can slide over the Reel Table, while the \*\* marked portion is against and cannot slide over the Reel Table.
- (4) Put the Reel Block into the S mode.
- (5) After procedures (3) and (4) are completed, insert a poly-slider washer (0.25 mm thick) under the Supply Reel Table.

##### . Adjustment washer:

poly-slider washer, 4 mm dia.  
0.13 mm thick      3-701-441-01  
0.25 mm thick      3-701-441-11  
0.5 mm thick        3-701-441-21



**(Step 5)**



### 6-1-5. Reel Table Rotation Detector Block Position Adjustment

**Tool:** Thickness gauge

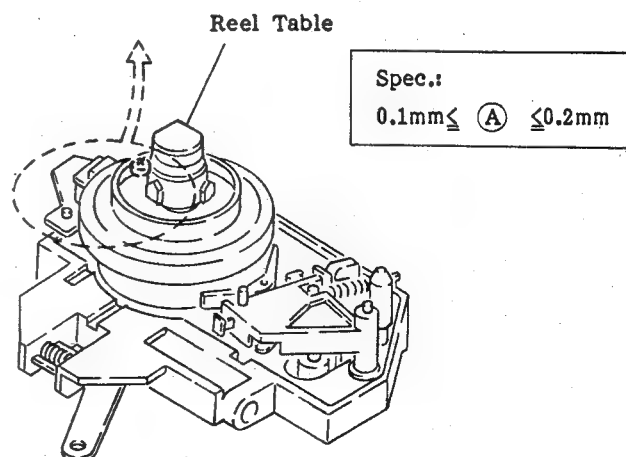
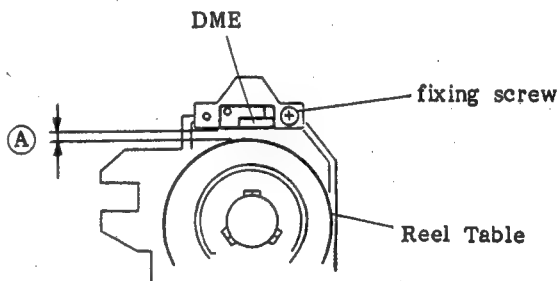
**Mode:** Unthreading end mode (L or S mode)

### Check procedure:

- (1) Check that the clearance between the Take-up Reel Table/Supply Reel Table and the DME on the Reel Table Rotation Detector meets the required specification.

**Adjustment procedure:**

- (1) Loosen the fixing screw of the Take-up Reel Table Rotation Detector Block.
- (2) Adjust the position of the Reel Table Rotation Detector Block meets the required specification.
- (3) Adjust the position of the Supply Reel Table Rotation Detector Block in the same way.



## 6-2. BRAKE SYSTEM ADJUSTMENT

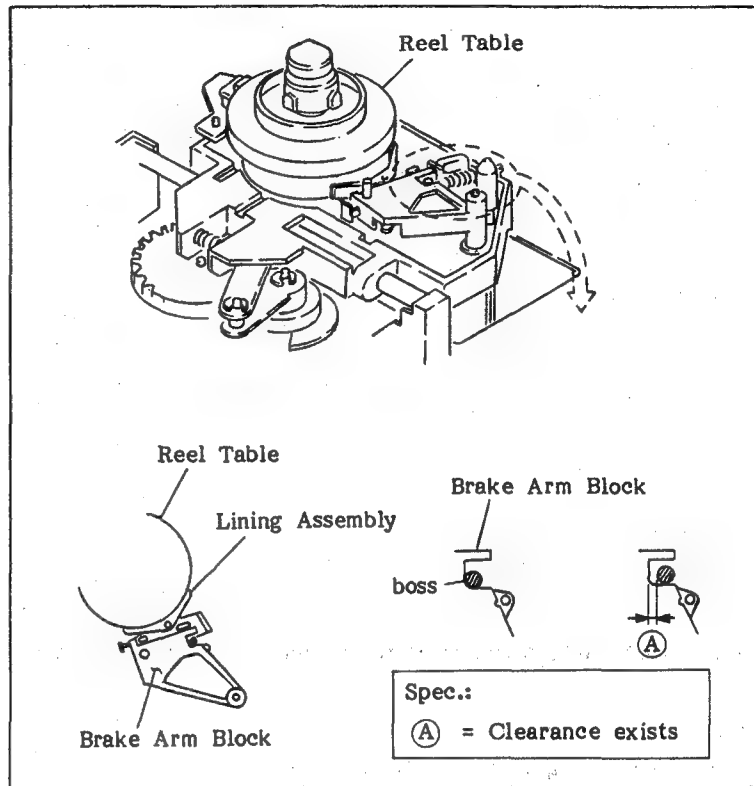
### 6-2-1. Reel Table Brake Clearance Adjustment

#### Check procedure:

- (1) When turning the Take-up Reel Table in the counterclockwise direction by hand, check that the clearance between the Brake Arm Block and the boss exists.
- (2) When turning the Supply Reel Table in the clockwise direction, check that the clearance between the Brake Arm Block and the boss exists.

#### Adjustment procedure:

- (1) Replace the Lining Ass'y as described in Section 5-6, Replacement of the Reel Table Brake.
- (2) Check it again.



### 6-2-2. Reel Table Brake Release Adjustment

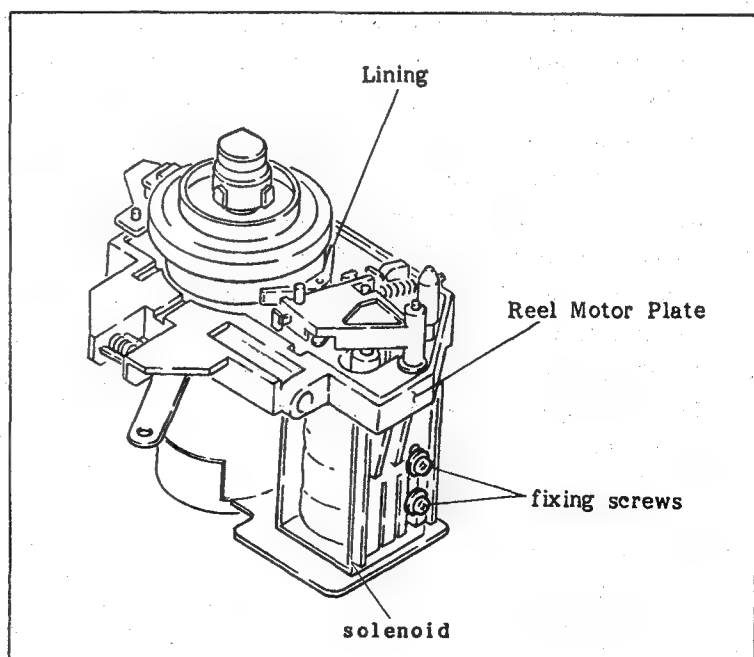
**Mode:** STOP mode (POWER ON)

#### Check procedure:

- (1) Check that the Take-up Reel Lining does not touch the Take-up Reel Table during Take-up Reel Table rotation.
- (2) Check that the Supply Reel Lining does not touch the Supply Reel Table during Supply Reel Table rotation.

#### Adjustment procedure:

- (1) Remove the Reel Motor Plate.
- (2) Loosen the fixing screws of the solenoid.
- (3) Lower the solenoid slight and secure it using the screws.
- (4) Confirm according to the check procedure.
- (5) Install the Reel Motor Plate and perform Section 6-1-2, Cassette Holder Height Adjustment (S); and 6-1-4, Reel Table Height Adjustment.



### 6-3. TENSION REGULATOR SYSTEM ADJUSTMENT

#### 6-3-1. Tension Regulator Arm Position Adjustment

. This adjustment is closely related to the video tracking adjustment and the tension regulator arm slantness adjustment.

After this adjustment, perform Section 8-1, Video Tracking Adjustment; and Section 6-3-2, Tension Regulator Arm Slantness Adjustment.

**Tools:** Tension scale (50 g full scale)  
Wire clearance gauge  
Locally-produced-tape  
(Refer to "alignment information".)

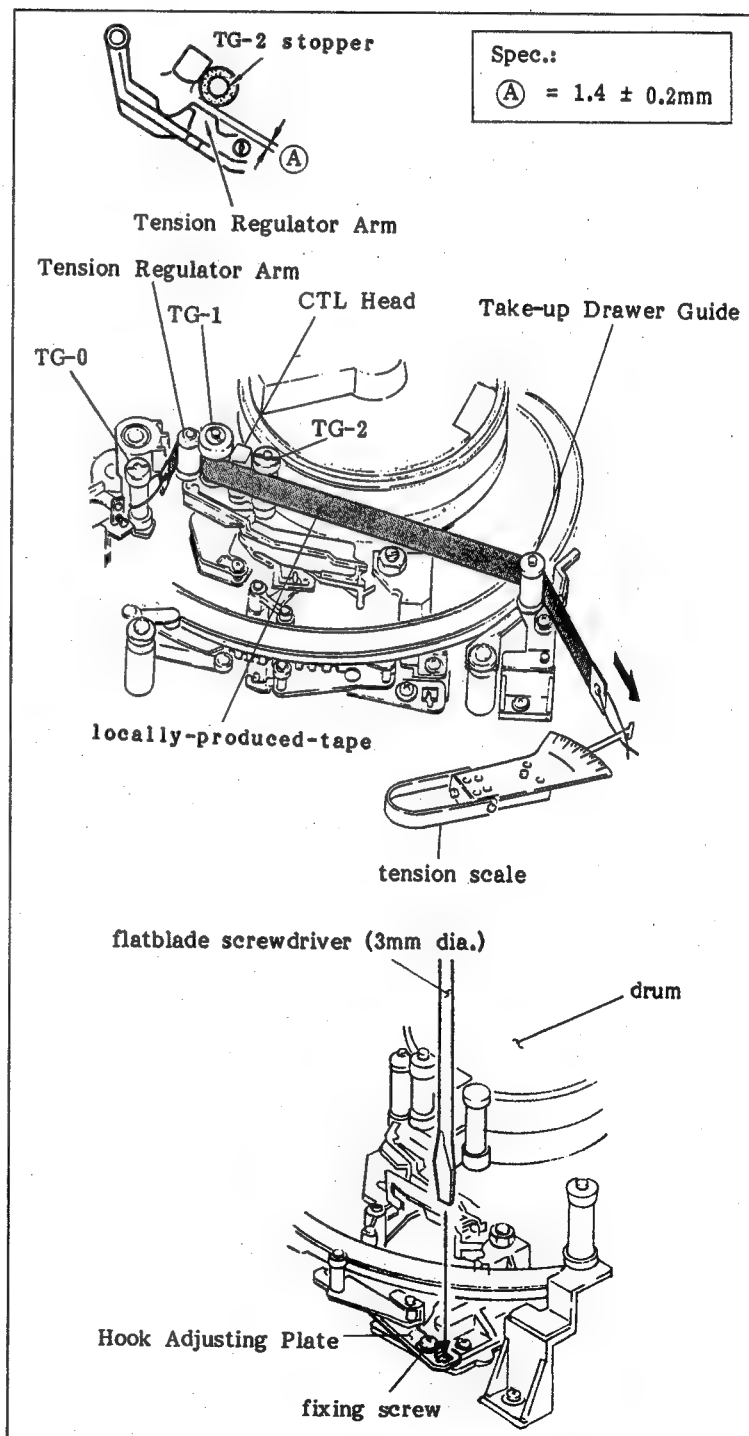
**Mode:** Threading end mode without a cassette.  
(Turn the power OFF.)

#### Check procedure:

- (1) Install the locally-produced-tape as shown in the figure.
- (2) Hook a tension scale to an end of the string. Pull out the tape in the direction of the arrow so that the scale reading is 45 g.
- (3) When the scale reading is 45 g, check that the clearance between the stopper of the Tape Guide (2) and the Tension Regulator Arm meets the required specification.

#### Adjustment procedure:

- (1) Loosen the fixing screw of the Hook Adjustment Plate 1/4 to 1/2 turn.
- (2) Insert a flatblade screwdriver (3 mm dia.) into the adjusting hole as shown in the figure, then adjust it to meet the required specification.
- (3) After adjustment, check as described in the check procedures.



### 6-3-2. Tension Regulator Arm Slantness Adjustment

- . This adjustment is closely related to the video tracking adjustment.
- . After this adjustment, perform Section 8-1, Video Tracking Adjustment.

**Tool:** Cassette reference plate (L)

Tension regulator slantness check tool

**Mode:** Threading end mode

**Check procedure:**

- (1) Install the cassette reference plate (L) into the cassette position.
- (2) Place the tension regulator slantness check tool against the Tension Regulator Roller. Check that the slantness of the roller meets the required specification viewed from the direction of arrows A and B as shown in the figure.

**Adjustment procedure:**

- . When the slantness is out of spec. (placed from the direction of arrow A).

- (1) Loosen the fixing screw 1/2 to 1 turn.
- (2) Adjust the slantness with the adjustment screws (A) and (B).

- (3) Tighten the fixing screw and check again.

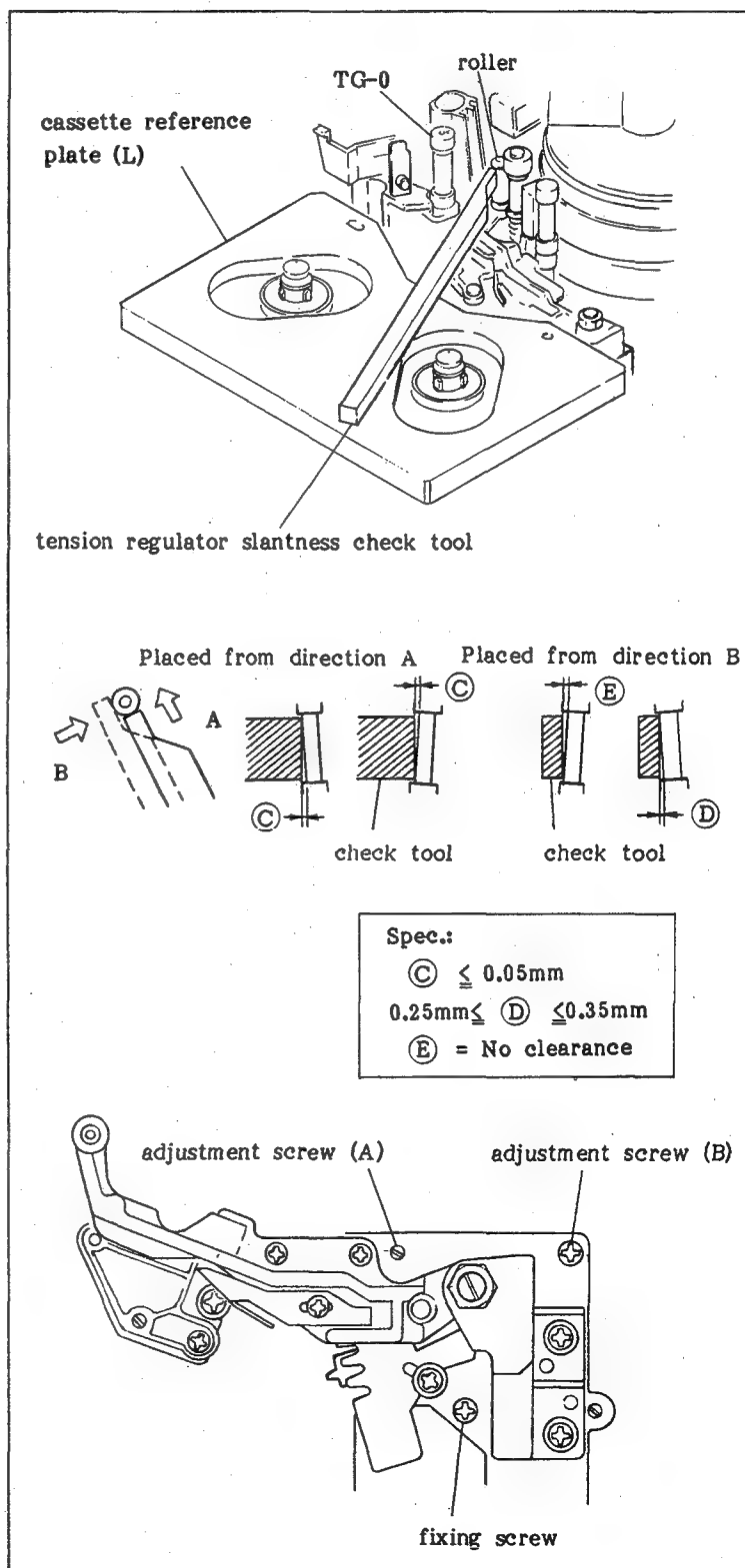
- (4) After adjustment, perform the Step (8).

- . When the slantness is out of spec. (placed from the direction of arrow B).

- (5) Loosen the fixing screw 1/2 to 1 turn.
- (6) Adjust the slantness with the adjustment screw (B).

- (7) Tighten the fixing screw and check again.

- (8) After adjustment, perform Section 6-3-1, Tension Regulator Arm Position Adjustment; Section 8-1, Video Tracking Adjustment.



#### 6-4. THREADING RING ROTATION ADJUSTMENT

- This adjustment is required only when the Threading Ring or Ring Roller (B) Ass'y is replaced or removed.

**Mode:** Turn the power OFF while rotating the Threading Ring 180 degrees from unthreading end state.

**Check procedure:**

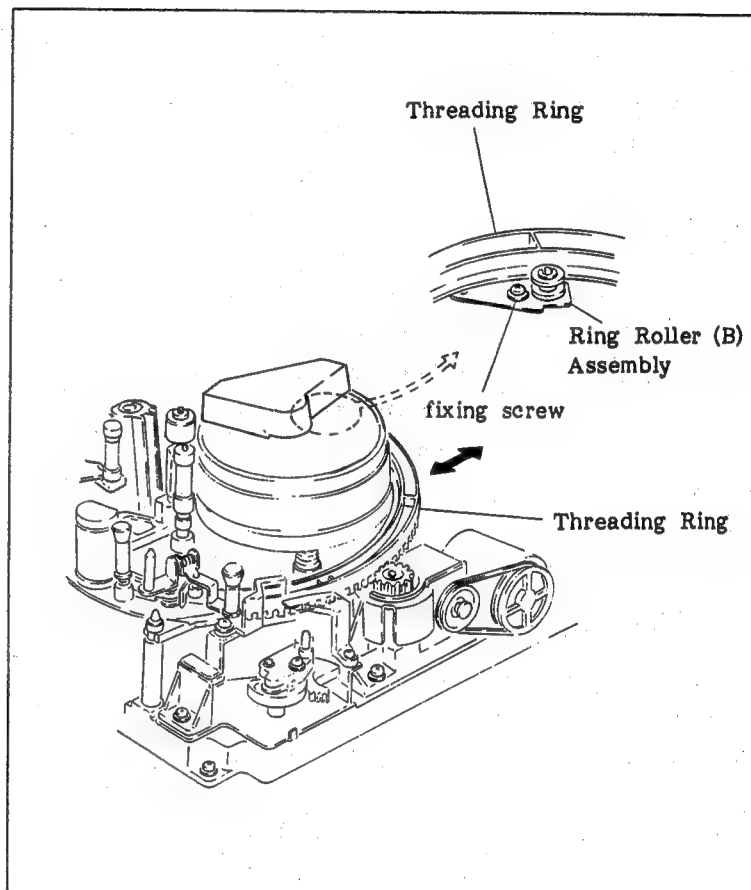
- (1) Check that the horizontal play meets the required specification when the Threading Ring is pushed in the direction of the arrow by hand.
- (2) Check that the rotation of the Threading Ring into the threading and unthreading modes is smooth.

**Adjustment procedure:**

- (1) Loosen the fixing screw of the Ring Roller (B) Ass'y 1/2 to 1 turn.
- (2) Adjust the position of the Ring Roller (B) Ass'y to meet the required specification.

**Adjusting procedure:**

- Insert a 0.3 mm thick piece of paper between the Threading Ring and the Ring Roller.
- The paper of this manual is about 0.1 mm thick so that three pages are 0.3 mm thick.



## 6-5. GEAR BOX POSITION ADJUSTMENT

. It is required that Section 6-4, Threading Ring Rotation Adjustment is correct before initiating this adjustment.

**Tool:** Wire clearance gauge

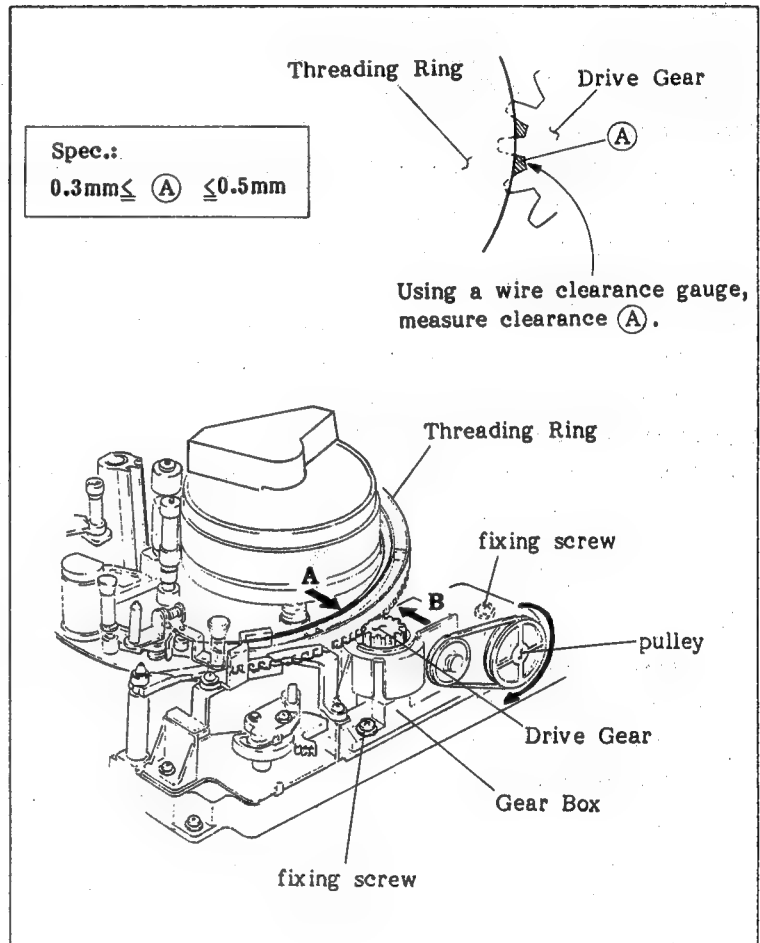
**Mode:** Unthreading end mode

### Check procedures:

- (1) Turn the pulley of the Gear Box by hand about 90 degrees in the direction of the arrow.
- (2) When pushing the Threading Ring in the direction of arrow (B) by hand, check that the clearance between the Threading Ring and the Drive Gear of the Gear Box meets the required specification with the wire clearance gauge.

### Adjustment procedure:

- (1) Loosen the fixing screws of the Gear Box 1 to 2 turns.
- (2) Press the Threading Ring in the direction of arrow (A), while lightly pushing the Drive Gear of the Gear Box against the Threading Ring.
- (3) Tighten the fixing screws of the Gear Box.
- (4) After adjustment, check as described in the check procedures.





## 6-6. PINCH ROLLER PRESS BLOCK POSITION ADJUSTMENT

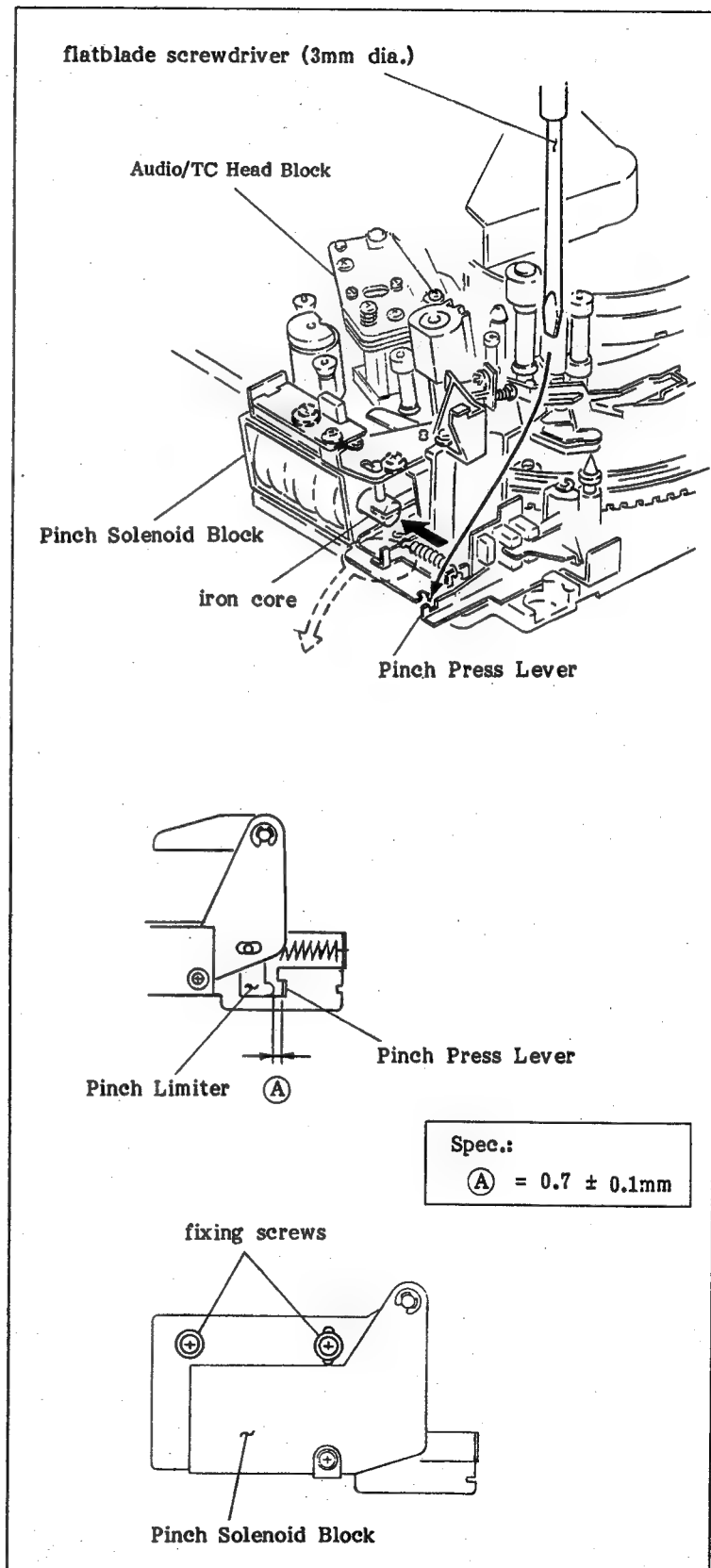
Mode: Threading end mode

### Check procedure:

- (1) Move the iron core of the Pinch Solenoid to the fully energized position in the direction of the arrow.
- (2) Check that the clearance between the Pinch Press Lever and the Pinch Limiter meets the required specification.

### Adjustment procedure:

- (1) Loosen the two fixing screws of the Pinch Solenoid Block 1/4 to 1/2 turn.
- (2) Insert a flatblade screwdriver (3 mm dia.) into the adjusting hole of the Pinch Solenoid Block, then adjust the position of the Pinch Solenoid Block to meet the required specification.
- (3) Tighten the two fixing screws, check as described in the check procedures.



## 6-7. TENSION SENSOR POSITION ADJUSTMENT

**Tool:** Digital multimeter  
Tension scale (50 g full scale)  
Locally-produced-tape  
(Refer to "alignment information".)

**Mode:** PLAY mode without a cassette tape

### Preparation:

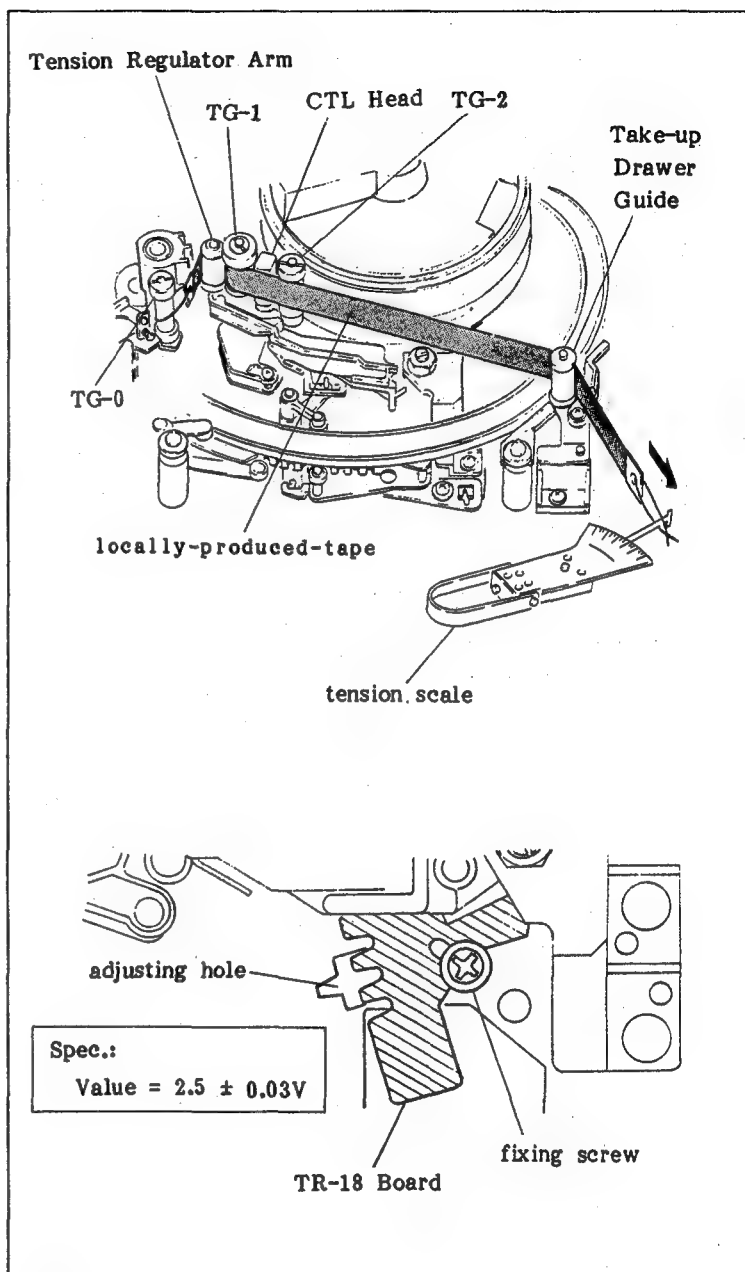
- (1) Connect the digital multimeter to TP23 on the SV-99 Board.

### Check procedure:

- (1) Install the locally-produced-tape as shown in the figure.
- (2) Hook a tension scale to an end of the string. Pull the tape in the direction of the arrow so that scale reading is 45 g.
- (3) When the scale reading is 45 g, check that the reading of the digital multimeter meets the required specification.

### Adjustment procedure:

- (1) Loosen the fixing screw of the TR-18 Board about 1/4 to 1/2 turn.
- (2) Insert a flatblade screwdriver (3 mm dia.) into the adjusting hole, then adjust the position of the TR-18 Board to meet the required specification.
- (3) Tighten the fixing screw, check that it meets the required specification again.
- (4) After adjustment, perform Section 6-8, Tension Sensor Sensitivity Adjustment.



## 6-8. TENSION SENSOR SENSITIVITY ADJUSTMENT

. It is required that Section 6-7, Tension Sensor Position Adjustment is correct before initiating this adjustment.

**Tool:** Digital multimeter

Tension scale (50 g full scale)

Locally-produced-tape

(Refer to "alignment information".)

**Mode:** PLAY mode without a cassette tape

**Preparation:**

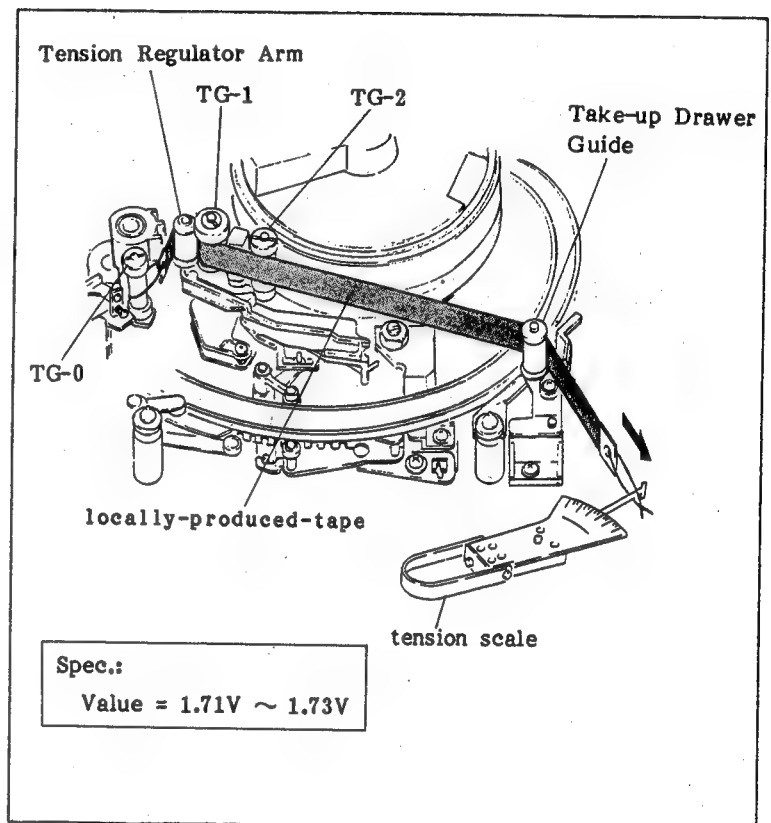
- (1) Connect the digital multimeter to TP23 on the SV-99 Board.

**Check procedure:**

- (1) Install a locally-produced-tape as shown in the figure.
- (2) Hook a tension scale to an end of the string. Pull the tape in the direction of the arrow so that scale reading is 25 g.
- (3) When the scale reading is 25 g, check that the reading of the digital multimeter meets the required specification.

**Adjustment procedure:**

- (1) Adjust RV3 on the SV-99 Board to meet the required specification.
- (2) After adjustment, check that it meets the required specification again.





## **SECTION 7 TORQUE ALIGNMENT**

### **ALIGNMENT INFORMATION**

#### **MODES**

The following procedures are described without installing the Cassette-up Compartment.

##### **How to put the unit into the threading end mode**

- (1) Turn ON the POWER.
- (2) Press any function button except EJECT. The threading ring rotates counterclockwise.  
(This mode is called threading mode.)
- (3) The threading ring rotation is stopped, then the unit enters the threading end mode.

##### **How to put the unit into the unthreading end mode**

- (1) Press the EJECT button in the threading end mode of the unit. The threading ring rotates clockwise. (This mode is called unthreading mode.)
- (2) The threading ring rotation is stopped, then the unit enters the unthreading end mode.

##### **How to put the unit into the PLAY mode without a cassette tape**

- (1) Turn ON the POWER, and press the PLAY button. The threading ring rotates counterclockwise, and the threading ring rotation is stopped. Then the unit enters the PLAY mode. The pinch roller is pressed against the capstan shaft.

##### **How to put the unit into STANDBY OFF mode**

In the normal conditions, the unit enters the STANDBY OFF mode after one minute's Long Pause mode. But the Long Pause mode can set to one second by the following procedures:

- (1) Set the switches S3 and S4 on the SV-99 Board to " 0 ".
- (2) Press the STOP button. The unit enters the STANDBY OFF mode after one second's Long Pause mode. The drum rotation is stopped in the STANDBY OFF mode.

NOTE: After adjustment is completed, return the switches S3 and S4 on the SV-99 Board to the former positions (S3 to " 0 ", S4 to " 1 ").

##### **How to put the unit into REV x1 mode**

In the normal REVERSE SEARCH operation, put the unit into -3.5 times normal speed. But the REVERSE SEARCH speed can set to -1 times normal speed by the following procedures:

- (1) Short between TP11 and GND on the SV-99 Board with a short clip lead. At this time, "AJ000" is displayed on the Time Counter Display on the Front Panel.
- (2) Press the switch S1 on the SV-99 Board 15 times so that the "AJ015" is displayed on the Time Counter Display. In this state, press the REVERSE SEARCH button, the unit put into the REVx1 mode.

**How to move the reel table without a cassette-up compartment and cassette tape**

- (1) Turn ON the POWER.
- (2) Switch the S2 on the SY-121A Board to " L " or " S ", then the reel table moves to the designated position.  
L: L mode  
S: S mode

**NOTE:** If the switch S2 is turned to "L" or "S" in the cassette tape is installed state, the unit will be damaged. Never turn this switch in this state.

**How to stop the drum and the reel rotation in the unthreading end mode**

- (1) Press the EJECT button, the unit enters the unthreading end mode. (In this state, the drum rotates.)
- (2) Press the EJECT button again, the drum and the reel rotation is stopped.

## 7-1. BRAKE TORQUE CHECK

### 7-1-1. S Brake Torque Check

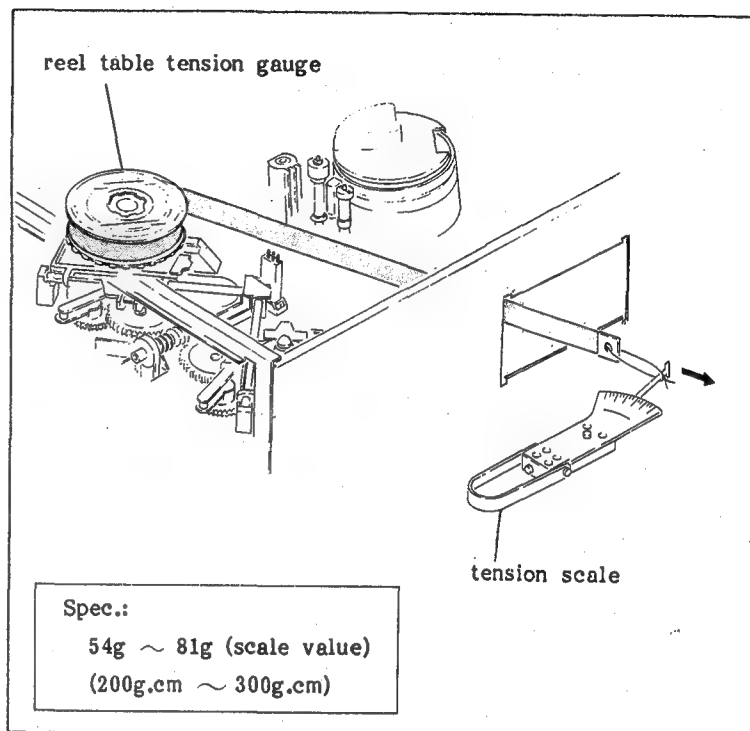
**Tool:** Reel table tension gauge

Tension scale (100 g full scale)

**Mode:** Unthreading end mode at the L cassette mode (POWER OFF mode)

**Check procedure:**

- (1) Wind the tape to the reel table tension gauge in the counterclockwise direction.
- (2) Install the reel table tension gauge on the Supply Reel Table. Pass the end of the tape out for the unit from the right side panel.
- (3) Hook a tension scale to an end of the string. Move the tension scale in the direction of the arrow, check that the scale reading meets the required specification.



### 7-1-2. T Brake Torque Check

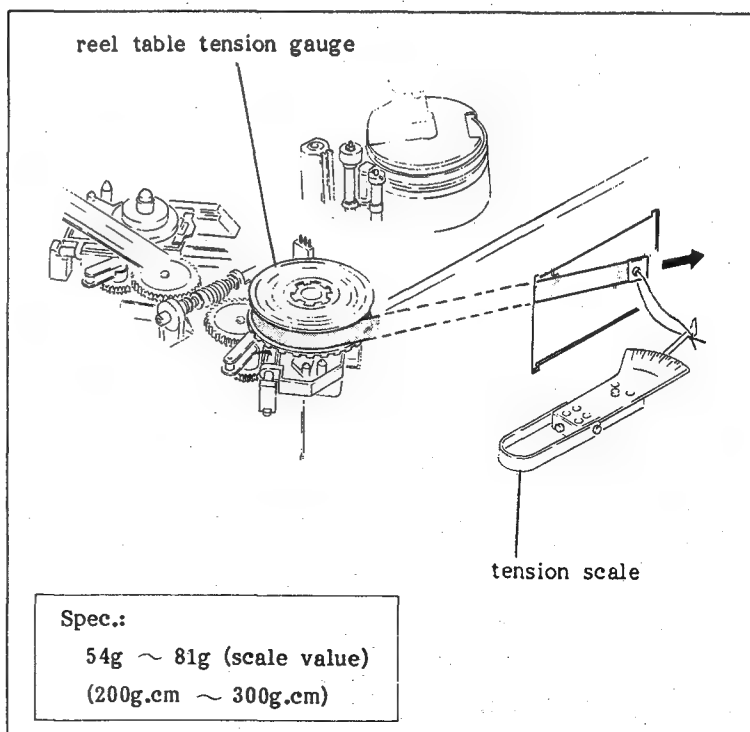
**Tool:** Reel table tension gauge

Tension scale (100 g full scale)

**Mode:** Unthreading end mode at the L cassette mode (POWER OFF mode)

**Check procedure:**

- (1) Wind the tape to the reel table tension gauge in the counterclockwise direction.
- (2) Install the reel table tension gauge on the Take-up Reel Table. Pass the end of the tape out for the unit from the right side panel.
- (3) Hook a tension scale to an end of the string. Move the tension scale in the direction of the arrow, check that the scale reading meets the required specification.



## 7-2. REEL TORQUE ADJUSTMENT

### 7-2-1. Reel Zero Gram Torque Adjustment

- . After this adjustment, perform the Section 7-2-2 Reel 150 Gram Torque Adjustment.

**Mode:** Unthreading end mode at the L cassette mode (POWER OFF mode)

**Preparation:**

- (1) Press the EJECT button two times without a cassette tape, then the drum rotation is stopped.  
(Check that the Reel Brake is released from the Reel Table.)
- (2) Short between TP11 and GND on the SV-99 Board with a short clip lead.

**Adjustment procedure:**

- (1) Press the switch S1 on the SV-99 Board 8 times so that the "AJ008" is displayed on the Time Counter Display.
- (2) Adjust the RV1 on the SY-121A Board so that the supply side reel table rotation is stopped.
- (3) Check that the supply side reel table is stopped, and then press the switch S2 on the SV-99 Board.
- (4) Press the switch S1 on the SV-99 Board 5 times so that the "AJ013" is displayed on the Time Counter Display.
- (5) Adjust the RV1 on the SY-121A Board so that the take-up side reel table is stopped.
- (6) Check that the take-up side reel table is stopped, and then press the switch S2 on the SV-99 Board.



- (7) Rotate the supply side reel table by hand. Check that the reel table more rotate counterclockwise than clockwise. In the same way, rotate the take-up side reel table by hand. Check that the reel table more rotate clockwise than counterclockwise.

\* Above mentioned conditions are the most suitable adjustment, but if not, the reel table rotations are acceptable as follows;

- . Supply side reel table;  
a little bit rotation to counterclockwise
- . Take-up side reel table;  
a little bit rotation to clockwise

- (8) After adjustment is completed, remove the short clip lead.

### 7-2-2. Reel 150 Gram Torque Adjustment

. It is required that Section 7-2-1 Reel Zero Gram Torque Adjustment is correct before initiating this adjustment.

**Tool:** Reel table tension gauge  
Tension scale (100 g full scale)

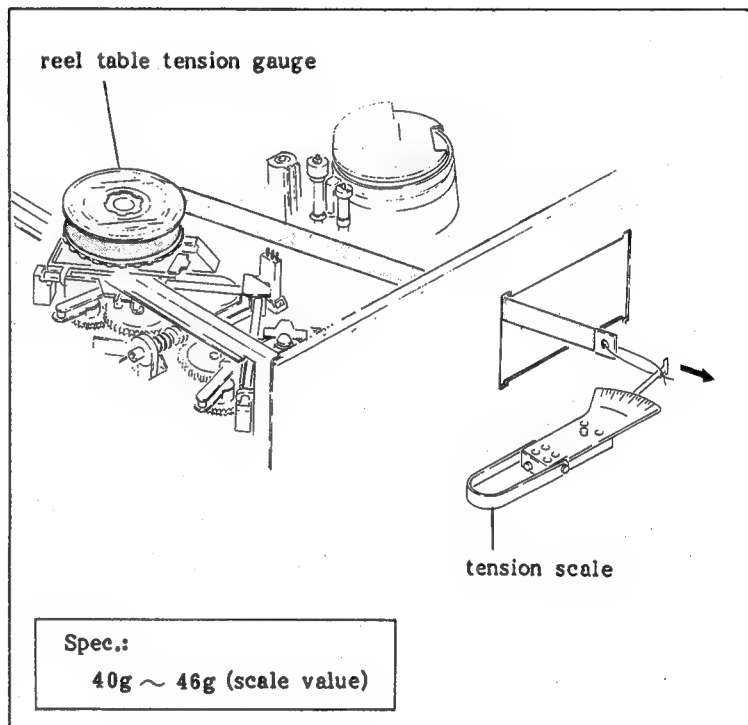
**Mode:** Unthreading end mode at the L cassette mode (POWER OFF mode)

#### Preparation:

- (1) Press the EJECT button two times without a cassette tape, then the drum rotation is stopped.  
(Check that the Reel Brake is released from the Reel Table.)
- (2) Short between TP11 and GND on the SV-99 Board with a short clip lead.

#### Check procedure:

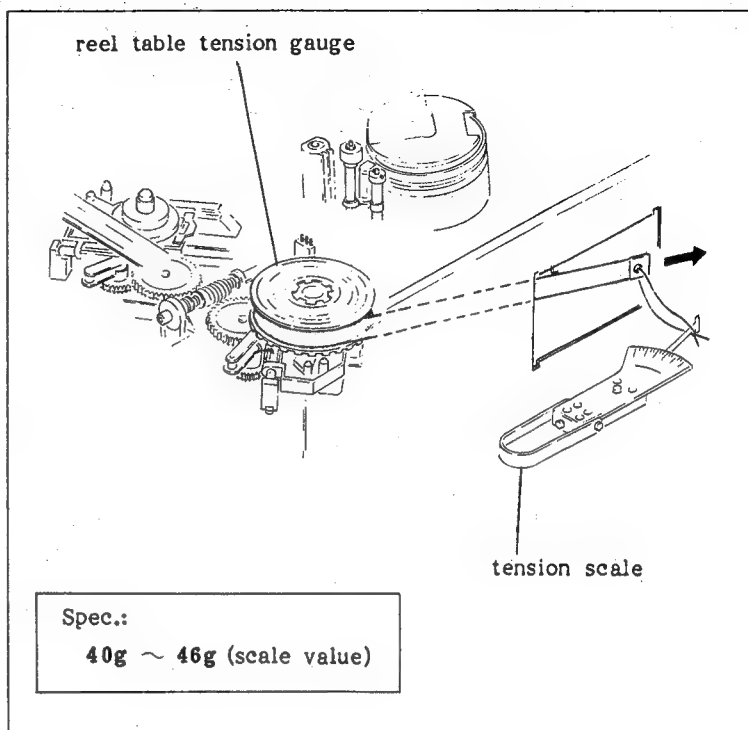
- (1) Wind the tape to the reel table tension gauge in the clockwise direction.
- (2) Press the switch S1 on the SV-99 Board 9 times so that the "AJ009" is displayed on the Time Counter Display. At this time, check that the supply side reel table rotation is stopped.
- (3) Stop the rotation of the Supply Reel Table by hand and install the reel table tension gauge on the Supply Reel Table. Pass the end of the tape out for the unit from the right side panel.
- (4) Hook a tension scale to an end of the string. Move the tension scale in the direction of the arrow and check that the scale reading is 40 to 46g.
- (5) If the specification is met, press the switch S2 on the SV-99 Board.



- (6) Remove the reel table tension gauge from the Supply Reel Table and wind the tape to the reel table tension gauge in the counterclockwise direction.
- (7) Press the switch S1 on the SV-99 Board 5 times so that the "AJ014" is displayed on the Time Counter Display. At this time, check that the take-up side reel table rotation is stopped.
- (8) Stop the rotation of the Take-up Reel Table by hand and install the reel table tension gauge on the Take-up Reel Table. Pass the end of the tape out for the unit from the right side panel.
- (9) Hook a tension scale to an end of the string. Move the tension scale in the direction of the arrow and check that the scale reading is 40 to 46g.
- (10) If the specification is met, press the switch S2 on the SV-99 Board, and remove the short clip lead.

**Adjustment procedure:**

- (1) Adjust RV1 on the SY-121A Board to meet the required specification at supply side as the same procedures in Section 7-2-1. Reel Zero Gram Torque Adjustment.
- (2) Adjust RV1 on the SY-121A Board to meet the required specification at take-up side as the same procedures in Section 7-2-1. Reel Zero Gram Torque Adjustment.
- (3) After adjustment is completed, remove the short clip lead.





## SECTION 8 TAPE RUN ALIGNMENT

### ALIGNMENT INFORMATION

#### MODES

The following procedures are described without installing the Cassette-up Comopartment.

#### How to put the unit into the threading end mode

- (1) Turn ON the POWER.
- (2) Press any function button except EJECT. The threading ring rotates counterclockwise. (This mode is called threading mode.)
- (3) The threading ring rotation is stopped, then the unit enters the threading end mode.

#### How to put the unit into the unthreading end mode

- (1) Press the EJECT button in the threading end mode of the unit. The threading ring rotates clockwise. (This mode is called unthreading mode.)
- (2) The threading ring rotation is stopped, then the unit enters the unthreading end mode.

#### How to put the unit into the PLAY mode without a cassette tape

- (1) Turn ON the POWER, and press the PLAY button. The threading ring rotates counterclockwise, and the threading ring rotation is stopped. Then the unit enters the PLAY mode. The pinch roller is pressed against the capstan shaft.

#### How to put the unit into STANDBY OFF mode

In the normal conditions, the unit enters the STANDBY OFF mode after one minute's Long Pause mode. But the Long Pause mode can set to one second by the following procedures:

- (1) Set the switches S3 and S4 on the SV-99 Board to " 0 ".
- (2) Press the STOP button. The unit enters the STANDBY OFF mode after one second's Long Pause mode. The drum rotation is stopped in the STANDBY OFF mode.

NOTE: After adjustment is completed, return the switches S3 and S4 on the SV-99 Board to the former positions (S3 to " 0 ", S4 to " 1 ").

#### How to put the unit into REV x1 mode

In the normal REVERSE SEARCH operation, put the unit into -3.5 times normal speed. But the REVERSE SEARCH speed can set to -1 times normal speed by the following procedures:

- (1) Short between TP11 and GND on the SV-99 Board with a short clip lead. At this time, "AJ000" is displayed on the Time Counter Display on the Front Panel.
- (2) Press the switch S1 on the SV-99 Board 15 times so that the "AJ015" is displayed on the Time Counter Display. In this state, press the REVERSE SEARCH button, the unit put into the REVx1 mode.

#### How to move the reel table without a cassette-up compartment and cassette tape

- (1) Turn ON the POWER.
- (2) Switch the S2 on the SY-121A Board to " L " or " S ", then the reel table moves to the designated position.  
L: L mode  
S: S mode

**NOTE:** If the switch S2 is turned to "L" or "S" in the cassette tape is installed state, the unit will be damaged. Never turn this switch in this state.

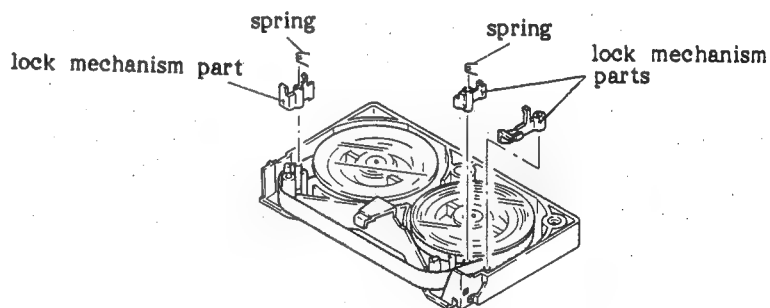
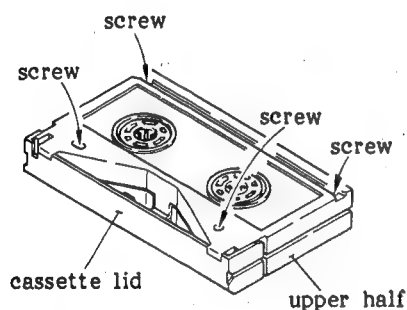
#### How to stop the drum and the reel rotation in the unthreading end mode

- (1) Press the EJECT button, the unit enters the unthreading end mode. (In this state, the drum rotates.)
- (2) Press the EJECT button again, the drum and the reel rotation is stopped.

#### Creating the Cassette Tape without Lid

Since the VTR is compact, some checks and adjustments cannot be performed if a cassette tape lid is installed. Remove the cassette tape lid as follows:

- (1) As shown in the figure, remove the four screws on the back of cassette tape BCT-20M and remove the upper half of the cassette tape.
- (2) Remove the lock mechanism parts and the springs on the left and right.
- (3) Remove the cassette lid from the upper half.
- (4) Install the upper half on the lower half with four screws from the back side.



#### Creating the Alignment tape without Lid

Since the VTR is compact, tracking is difficult to adjust if an alignment tape is installed. Remove the lid of alignment tape CR2-1B PS for tracking adjustment. For removing, refer to the "Creating the Cassette Tape without Lid".

## **ALIGNMENT INFORMATION**

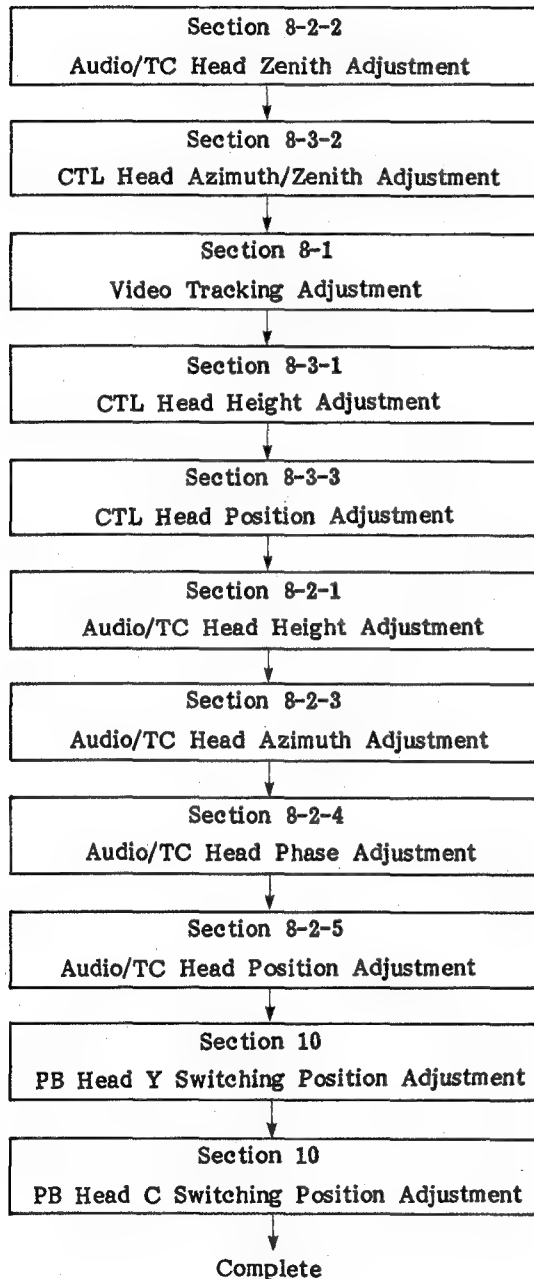
### **ALIGNMENT TAPE**

- . Alignment tape for tracking adjustment  
CR2-1B PS (8-960-096-51)

- . Alignment tape for general adjustment  
CR8-1B PS (8-960-096-86)

## TRACKING ADJUSTMENT

. The tracking adjustment is required to be performed in the following order:





## 8-1. VIDEO TRACKING ADJUSTMENT

**Tools:** Alignment tape, CR2-1B PS  
Oscilloscope  
Hex. key (across flat has 1.27 mm)  
Inspection mirror

**Mode:** Play back the alignment tape

### Preparation:

- (1) Short between TP2 and TP3 on the SV-99 Board with a short clip lead.  
(The servo H-lock circuit is turned off.)
- (2) Connect the oscilloscope as follows:  
CH-1: TP4/DM-74 Board  
EXT. TRIG: TP14/DM-74 Board
- (3) Play back the alignment tape.

### Check procedures:

- (1) When turn the TRACKING control knob, check that the RF waveform maintains a flat envelope while the amplitude increases and decreases.
- (2) Check that the RF envelope fluctuation and head-to-tape contact are within the specification at the FIXED position of the TRACKING control knob.
- (3) Check that the tape curls at the Tension Regulator, TG-1, TG-2, TG-3, and the Tape Threading Guide meets the required specification. (Refer to the adjustment procedure for specification.)
- (4) Check that the RF envelope head-to-tape contact is within the specification in the about REV x 1 mode.

### Adjustment procedure:

- When adjust the tape guide height.

Loosen the setscrews of each tape guide in upper portion and adjust with the adjusting nut.

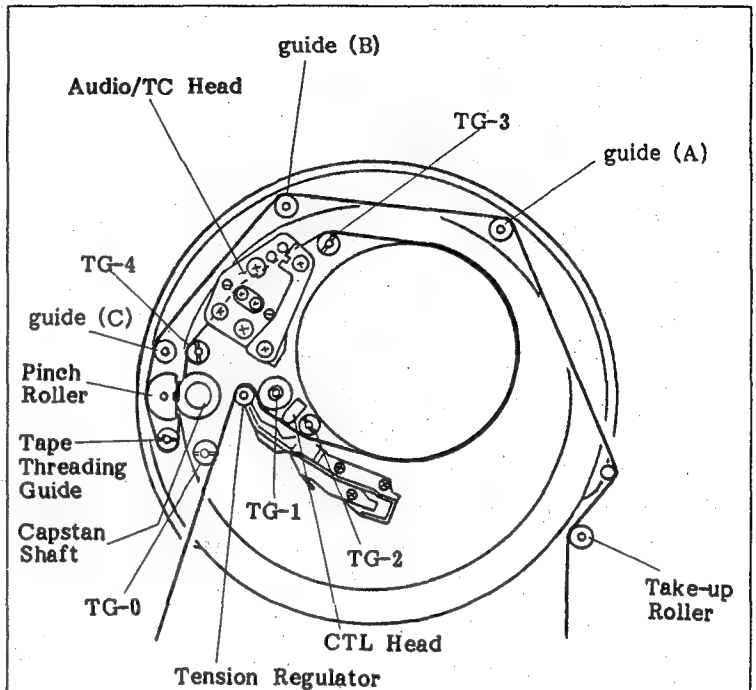


Fig. 1



### spec:

#### • During FWD

Head contact  $\frac{C}{A} \geq 0.8$   
 $\frac{B}{A} \geq 0.8$   
Head contact fluctuation  
 $\frac{D}{A} \geq 0.9$

#### • During REV

Head contact  $\frac{C}{A} \geq 0.6$   
 $\frac{B}{A} \geq 0.6$

. When the tracking at the drum entrance side is not good.

- (1) Turn the adjusting nuts of TG-1 and TG-2. Make clearances at (a) and (b) of TG-1, and (a) and (b) of TG-2 as shown in figure 2.
- (2) Turn the adjusting nut of the Tension Regulator so that the RF waveform envelope changes from state (i) to state (ii) as shown in Fig. 3. Check that the tape runs in contact with the guide flange at the (a) portion of the Tension Regulator. If not, turn adjustment screw (b) of the Tension Regulator in counter-clockwise direction as shown in Fig. 4.
- (3) Turn the adjusting nut of TG-2 so that the tape runs in contact with the guide flange at the (b) portion of TG-2 and the RF waveform envelope flattens. Check that the tape does not in contact with the guide flange at the (b) portion of TG-1. The tape curl at the (a) portion of Tension Regulator and/or (b) portion of TG-2 is acceptable within the range shown in Fig. 5. Tape curl at the drum, however, is not acceptable.
- (4) Turn the TRACKING control knob to the FIXED position. Put the unit into the REV x 1 mode.
- (5) Check that the RF waveform envelope is small at the drum entrance side as shown in Fig. 6.
- (6) Put the unit into the PLAY mode. Turn the adjusting nut of TG-1 so that the tape runs in contact with the guide flange at the (a) portion. The tape curl at (a) portion is acceptable within the range shown in Fig. 5.
- (7) Put the unit into the REV x 1 mode. Check that the RF envelope waveform is flat and the tape-to-head contact meets the required specification.

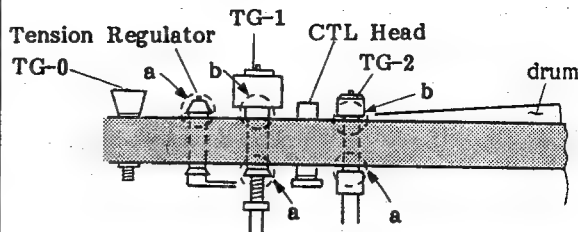
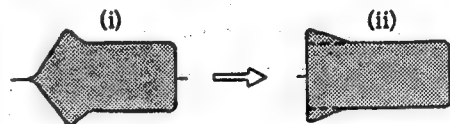


Fig. 2



When tape portion "a" of the Tension Regulator shown in Fig.2 is pressed down, the waveform should be flat.

Fig. 3

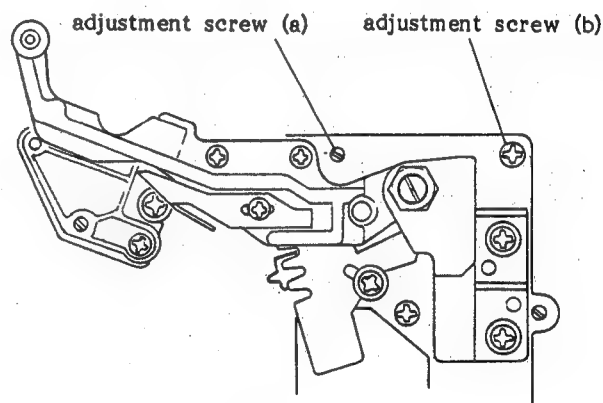


Fig. 4

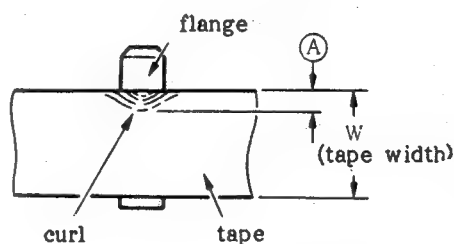


Fig. 5

spec:  
 $\textcircled{A} \leq \frac{1}{6} W$



Fig. 6

- (8) Put the unit into the PLAY mode. Check that the tape-to-head contact meets the required specification.
  - (9) Tighten the setscrews of each tape guide, and check again.
  - (10) Remove the short clip lead.
- . When the tracking at the drum exit side is not good.
- (1) Turn the adjusting nuts of TG-3 and TG-4, and make clearances at (a) of TG-3, (b) of TG-4, and (a) and (b) of the Tape Threading Guide as shown in Fig. 7.
  - (2) Turn the adjusting nut of TG-4 so that the RF waveform envelope changes from state (i) to state (ii) shown in Fig. 8. Check that the tape does not in contact with the guide flange at the (a) portion of TG-3 or (a) portion of the Tape Threading Guide.
  - (3) Turn the adjusting nut of TG-3 so that the tape runs in contact with the guide flange at the (a) portion of TG-3 and the RF waveform envelope flattens. The tape curl is acceptable within the range shown in Fig. 5.
  - (4) Turn the adjusting nut of the Tape Threading Guide so that the tape runs lightly in contact with the guide flange at the (a) portion.
  - (5) Turn the TRACKING control knob to the FIXED position. Check that the tape-to-head contact meets the required specification.
  - (6) Put the unit into the REV x 1 mode.
  - (7) Check that the RF waveform envelope is flat and the tape-to-head contact meets the required specification.
  - (8) Tighten the setscrews of each tape guide, and check again.
  - (9) Remove the short clip lead.

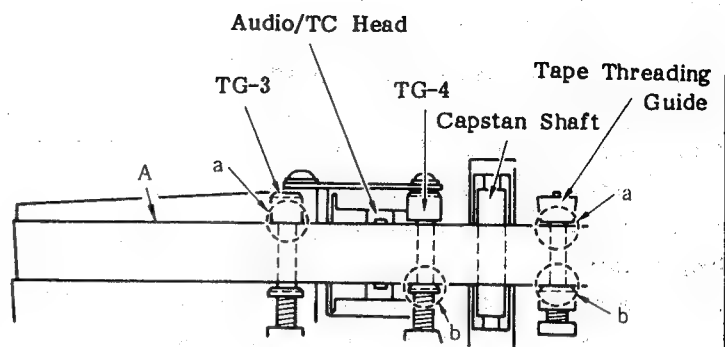
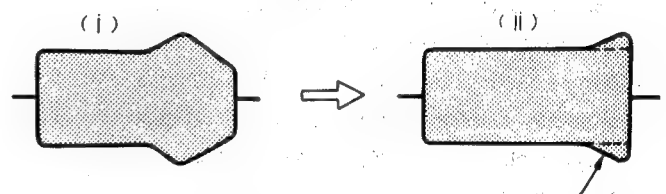


Fig. 7



When tape portion "A" shown in Fig. 7 is pressed down, the waveform should be flat.

Fig. 8

## 8-2. AUDIO/TC HEAD ADJUSTMENT

### 8-2-1. Audio/TC Head Height Adjustment

**Tool:** Alignment tape, CR8-1B PS

Dual-trace oscilloscope or VTVM

**Mode:** Play back the alignment tape.

**Preparation:**

- (1) Check that the "DOLBY NR" switch on the Front Panel is off. (The Dolby NR (Noise Reduction) circuit is off.)
- (2) Connect the oscilloscope or VTVM to the AUDIO OUT CH-1 or CH-2.
- (3) Play back the last 1 kHz signal segment on the alignment tape. (Never play back the 1 kHz signal segment at the tape top.)

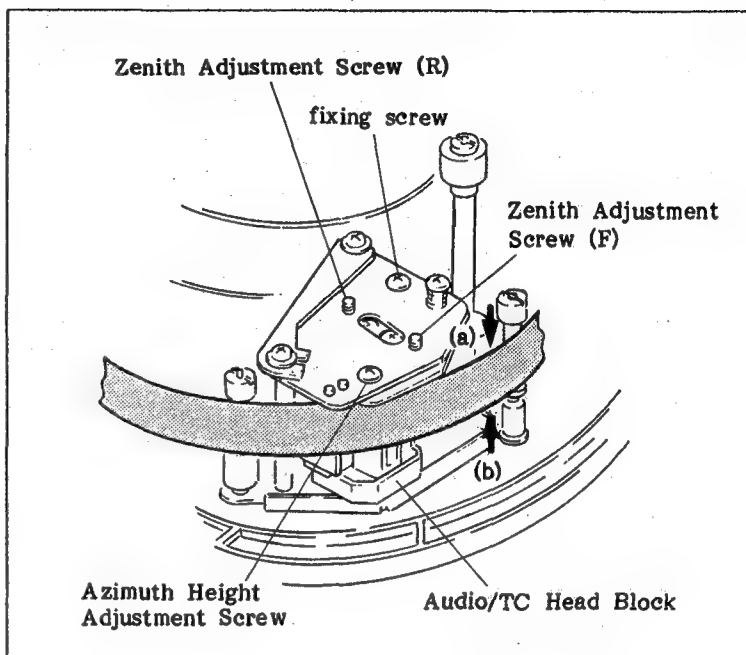
**Check procedure:**

- (1) When pressing down the tape at (a) portion, check that the level decreases.
- (2) When pushing up the tape at (b) portion, check that the level decreases.

**Adjustment procedure:**

. When the level increase while pressing down the tape at (a) portion.

- (1) Loosen the fixing screw of the Audio/TC Head 2 to 3 turns.
- (2) Turn the Zenith Adjustment Screws (R) and (F) in the counterclockwise direction and turn the Azimuth Height Adjustment Screw in the clockwise direction an exactly equal amount. Adjust for maximum output waveform.
- (3) Tighten the fixing screw and check again.



- . When the level increases while pushing up the tape at (b) portion.
- (4) Turn the Zenith Adjustment Screws (R) and (F) in the clockwise direction and turn the Azimuth Height Adjustment Screw in the counterclockwise direction an exactly equal amount. Adjust for maximum output waveform.
- (5) Tighten the fixing screw and check again.
- (6) Perform Section 8-2-2, Audio/TC Head Zenith Adjustment; Section 8-2-3, Audio/TC Head Azimuth Adjustment; Section 8-2-4, Audio/TC Head Phase Adjustment; and Section 8-2-5, Audio/TC Head Position Adjustment.

## 8-2-2. Audio/TC Head Zenith Adjustment

**Tool:** Flatness plate

**Mode:** Unthreading end mode

### Check procedure:

- (1) Check that the clearance between the head and the flatness plate meets the required specification when the flatness plate is placed on the Audio/TC Head and the TG-3.

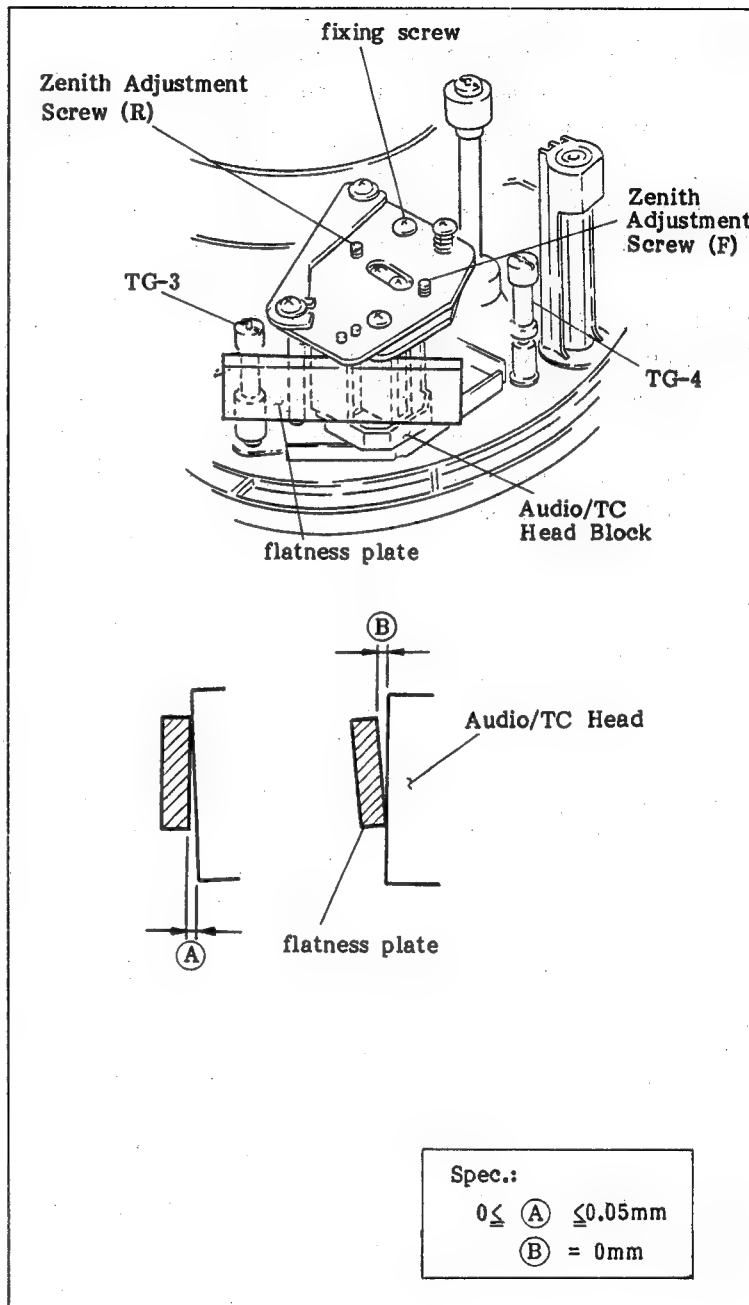
### Adjustment procedure:

. If there is the clearance at the bottom.

- (1) Loosen the fixing screw of the Audio/TC Head Block 1/4 to 1 turn.
- (2) Turn the Zenith Adjustment Screw (R) in the clockwise direction to meet the required specification.
- (3) Tighten the fixing screw and check again.

. If there is the clearance at the top.

- (4) Loosen the fixing screw of the Audio/TC Head Block 1/4 to 1 turn.
- (5) Turn the Zenith Adjustment Screw (R) in the counterclockwise direction to meet the required specification.
- (6) Tighten the fixing screw and check again.
- (7) After adjustment, perform Section 8-2-1, Audio/TC Head Height Adjustment; Section 8-2-3, Audio/TC Head Azimuth Adjustment; Section 8-2-4, Audio/TC Head Phase Adjustment; and Section 8-2-5, Audio/TC Head Position Adjustment.



### 8-2-3. Audio/TC Head Azimuth Adjustment

**Tool:** Alignment tape, CR8-1B PS  
Dual-trace oscilloscope or VTVM

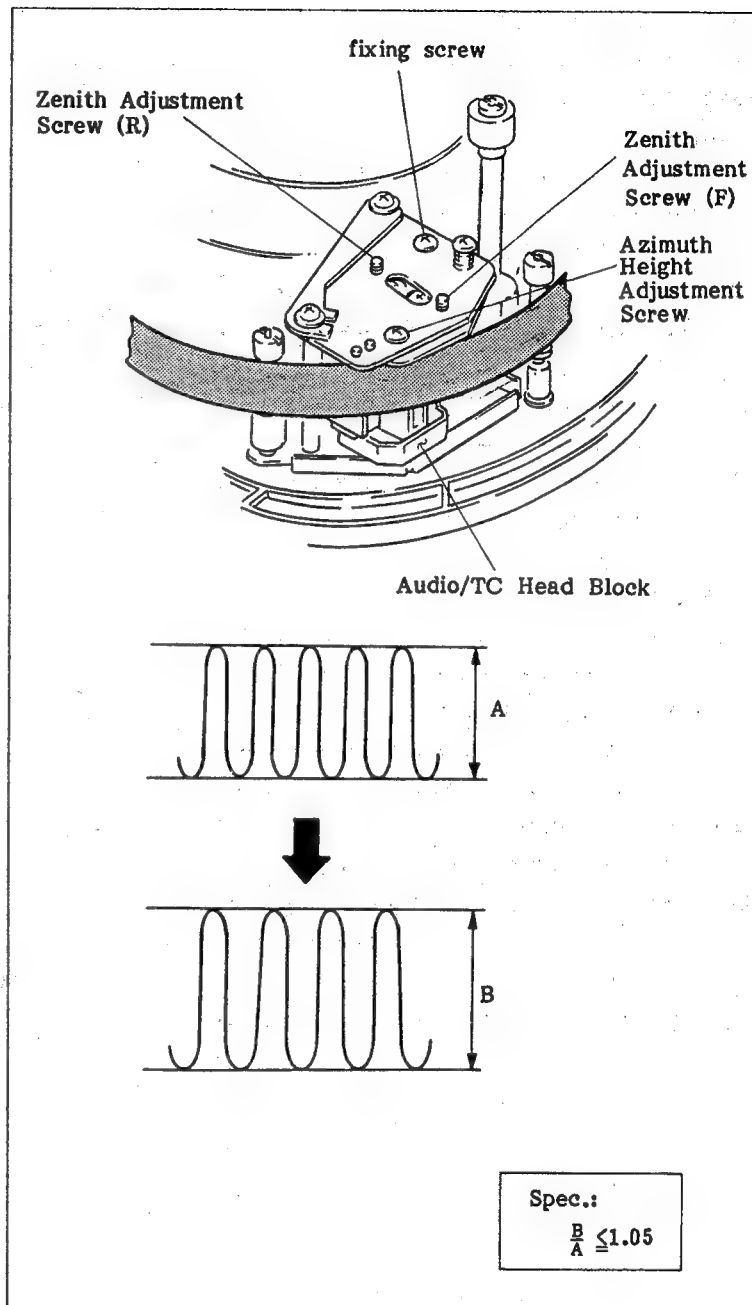
**Mode:** Play back the alignment tape.

**Preparation:**

- (1) Check that the "DOLBY NR" switch on the Front Panel is off. (Dolby NR (Noise Reduction) circuit is off.)
- (2) Connect the oscilloscope to the AUDIO OUT CH-1 or CH-2 terminal.
- (3) Play back the audio 15 kHz signal portion on the alignment tape.

**Adjustment procedures:**

- (1) Loosen the fixing screw of the Audio/TC Head 1 turn.
- (2) Adjust for the maximum output level by turning the Azimuth Height Adjustment Screws.
- (3) Tighten the fixing screw, check again. Play back the audio 15 kHz signal portion on the alignment tape. When holding down the tape near the drum with a skewer, check that the change of the level meets the required specification.
- (4) Perform Section 8-2-1, Audio/TC Head Height Adjustment; Section 8-2-4, Audio/TC Head Phase Adjustment; and Section 8-2-5, Audio/TC Head Position Adjustment.



#### 8-2-4. Audio/TC Head Phase Adjustment

**Tools:** Alignment tape, CR8-1B PS  
Dual-trace oscilloscope

**Mode:** Play back the alignment tape.

**Preparation:**

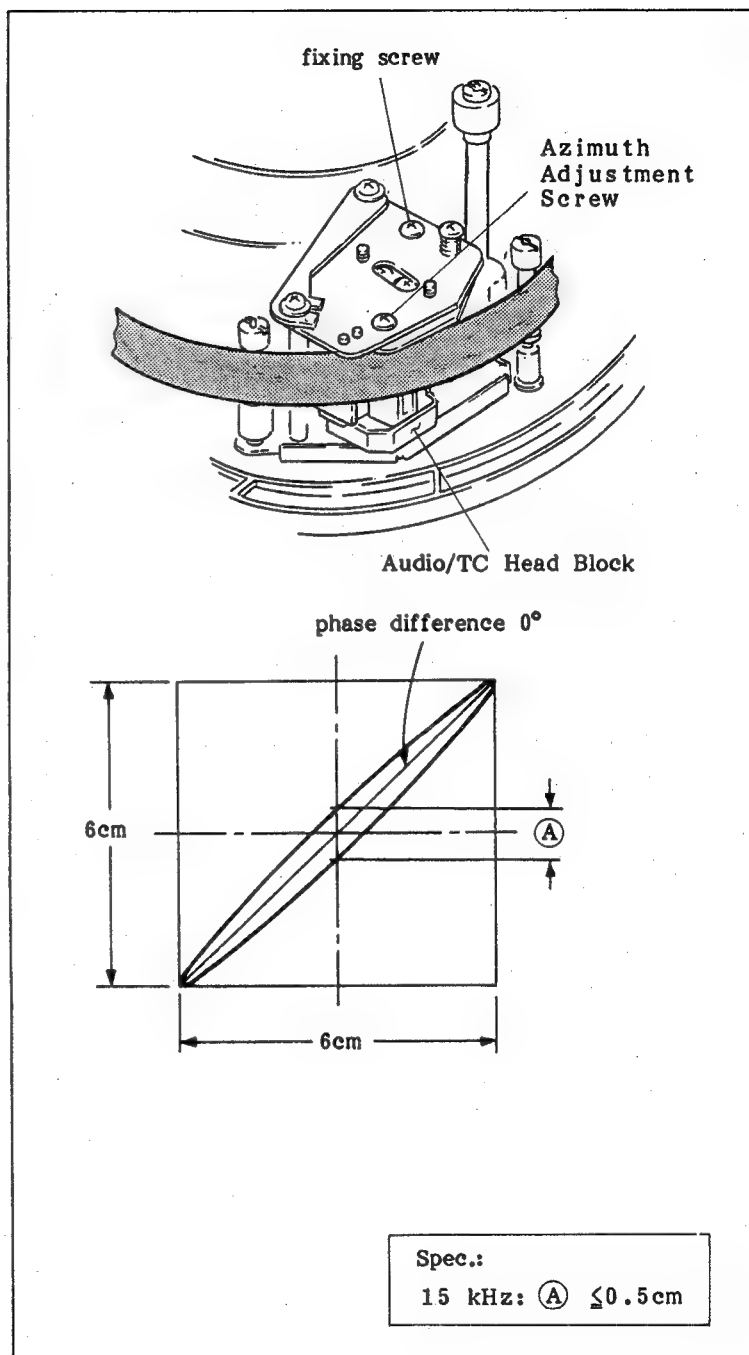
- (1) Check that the "DOLBY NR" switch on the Front Panel is off. (The Dolby NR (Noise Reduction) circuit is off.)
- (2) Connect the horizontal and vertical terminals of the oscilloscope to the AUDIO OUT CH-1 and CH-2 terminals.
- (3) Play back the audio 15 kHz portion on the alignment tape.
- (4) Adjust the scope for horizontal and vertical amplitudes for a 6 cm lissajous waveshape.

**Check procedure:**

- (1) Check that the vertical amplitude at the center in the horizontal direction is within the specification.
- (2) Check that the lissajous waveshape meets the required specification at 15 kHz.

**Adjustment procedure:**

- (1) Loosen the fixing screw 1/4 to 1/2 turn.
- (2) Turn the Azimuth Height Adjustment Screw to meet the required specification.
- (3) Tighten the fixing screw and check again.





### 8-2-5. Audio/TC Head Position Adjustment

- . It is required that the Section 8-3-3, CTL Head Position Adjustment is checked to be correct before initiating this adjustment.

**Tools:** Alignment tape, CR2-1B PS  
Dual-trace oscilloscope

**Mode:** Play back the alignment tape.

**Preparation:**

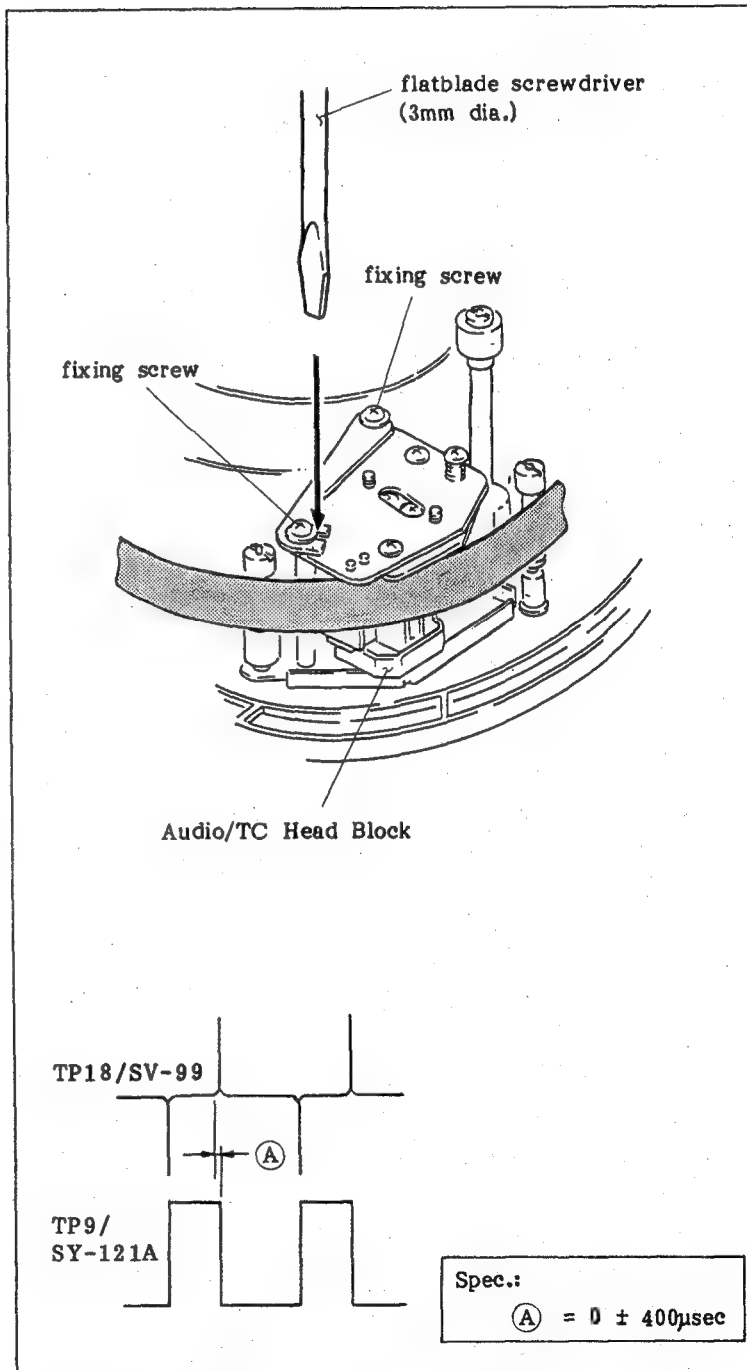
- (1) Connect the oscilloscope as follows:  
CH-1: TP18/SV-99 Board  
CH-2: TP9/SY-121A Board  
TRIG: INTERNAL, CH-1
- (2) Play back the alignment tape.

**Check procedure:**

- (1) Check that the waveform meets the required specification.

**Adjustment procedure:**

- (1) Loosen the fixing screws.
- (2) Adjust the position of the head block with a flatblade screwdriver (3 mm dia.) to meet the required specification.
- (3) Tighten the fixing screws, check again.
- (4) Perform Section 8-2-1, Audio/TC Head Height Adjustment; Section 8-2-2, Audio/TC Head Zenith Adjustment; Section 8-2-3, Audio/TC Head Azimuth Adjustment; and Section 8-2-4, Audio/TC Head Phase Adjustment.



### 8-3. CTL HEAD ADJUSTMENT

#### 8-3-1. CTL Head Height Adjustment

**Tool:** Alignment tape, CR8-1B PS  
Oscilloscope

**Mode:** Play back the alignment tape.

**Preparation:**

- (1) Connect the oscilloscope as follows:  
CH-1: TP17/SV-99 Board  
TRIG: INTERNAL, CH-1
- (2) Play back the last 1 kHz signal segment on the alignment tape. (Never play back the 1 kHz signal segment at the tape top.)

**Check procedure:**

- (1) When pressing the tape down and pushing it up at (A) portion, check that both levels decrease. If the levels increase, the following adjustments are required.

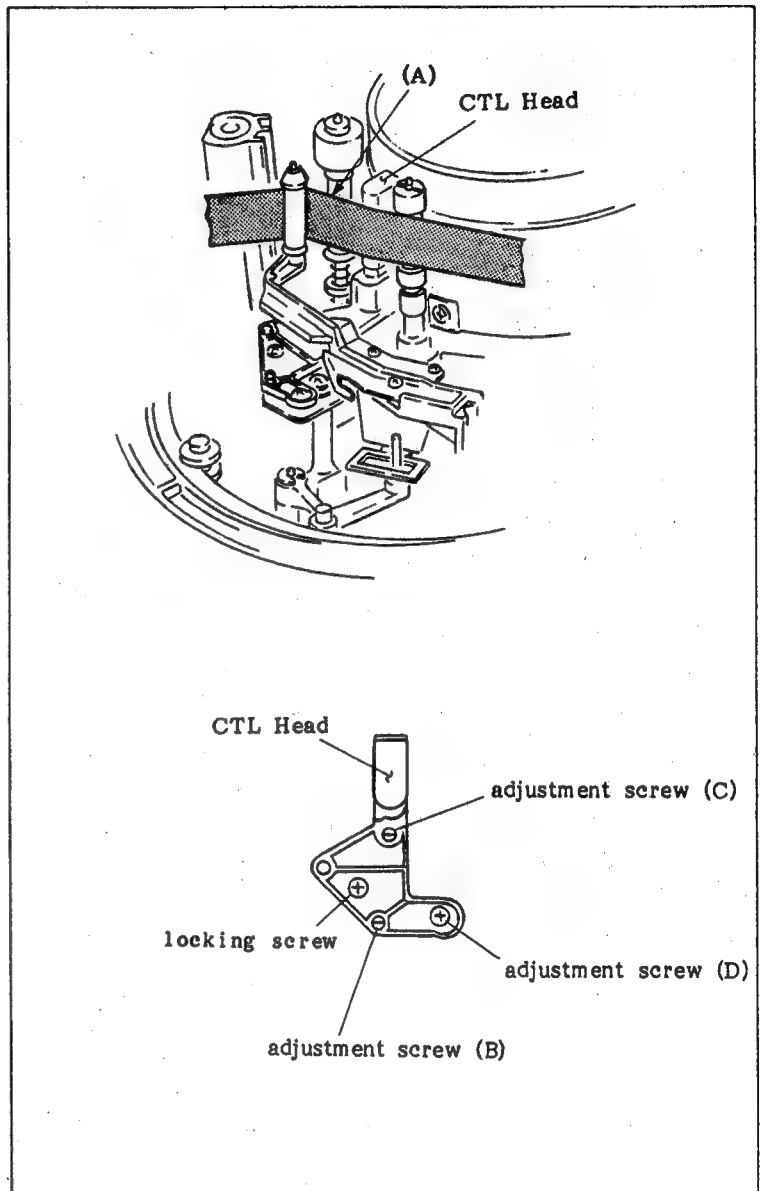
**Adjustment procedure:**

- . When the levels increase while pressing down the tape at (A) portion.

- (1) Loosen the locking screw 1 turn.
- (2) Turn the adjustment screw (D) in the counterclockwise direction and turn the adjustment screws (C) and (B) in the clockwise direction an exactly equal amount. Adjust for maximum output waveform.
- (3) Tighten the locking screw and check again.

- . When the levels increase while pushing up the tape at (A) portion.

- (4) Loosen the locking screw 1 turn.
- (5) Turn adjustment screw (D) in the clockwise direction and turn the adjustment screws (C) and (B) in the counterclockwise direction an exactly equal amount. Adjust the maximum output waveform.
- (6) Tighten the locking screw and check again.
- (7) After adjustment, perform Section 8-3-2, CTL Head Azimuth/Zenith Adjustment; and Section 8-3-3, CTL Head Position Adjustment.



### 8-3-2. CTL Head Azimuth/Zenith Adjustment

**Tool:** Cassette reference plate (L)

Tension regulator slantness check tool

**Mode:** Threading end mode

**Check procedure:**

- (1) Install the cassette reference plate (L) into the cassette position.
- (2) Place the tension regulator slantness check tool at the CTL Head as shown in the figure. Check that the slantness of the CTL Head meets the required specification.

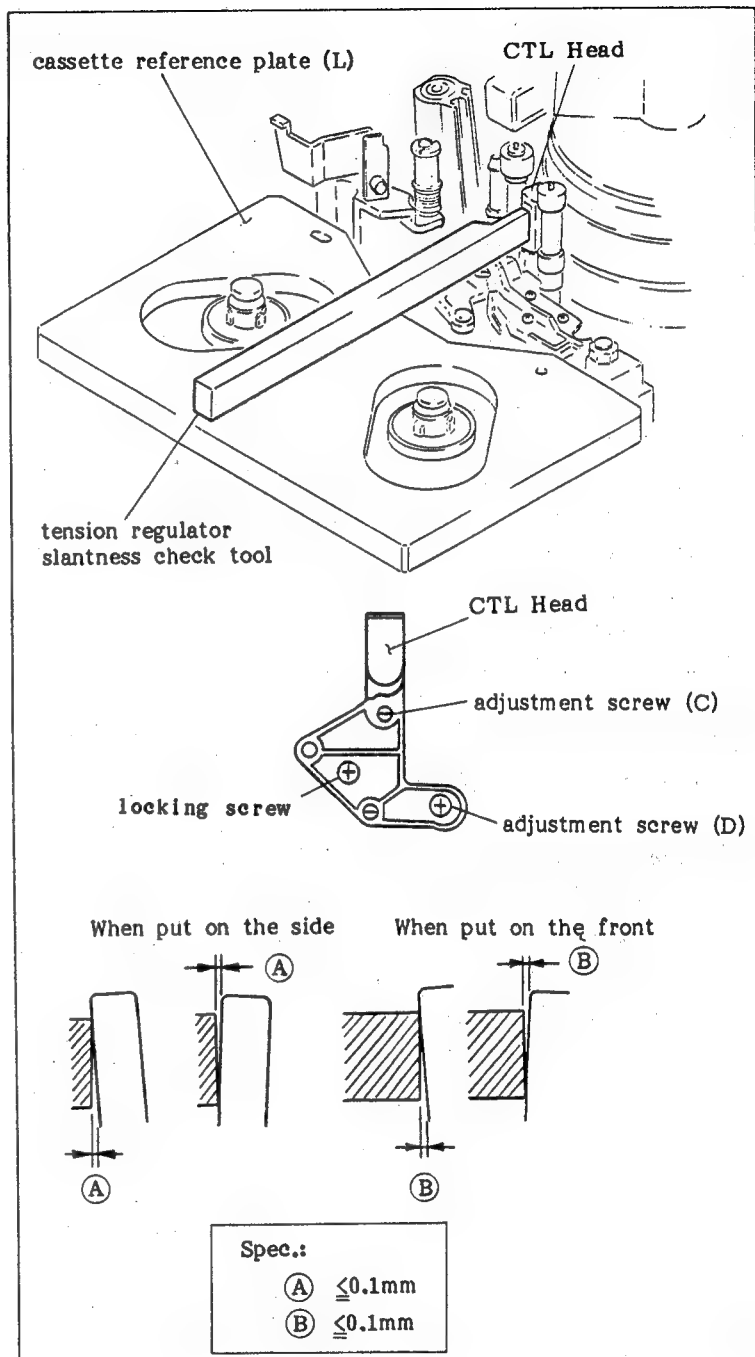
**Adjustment procedure:**

. When the zenith is out of spec.

- (1) Loosen the locking screw 1 turn.
- (2) Adjust the zenith with adjustment screw (C) to meet the required specification.
- (3) Tighten the locking screw and check the azimuth and zenith.

. When the azimuth is out of spec.

- (4) Loosen the locking screw 1 turn.
- (5) Adjust the azimuth with adjustment screw (D) to meet the required specification.
- (6) Tighten the locking screw and check the azimuth and zenith.
- (7) After adjustment, perform Section 8-3-1, CTL Head Height Adjustment; and Section 8-3-3, CTL Head Position Adjustment.



### 8-3-3. CTL Head Position Adjustment

**Tool:** Alignment tape, CR2-1B PS  
Oscilloscope

**Mode:** Play back the alignment tape.

**Preparation:**

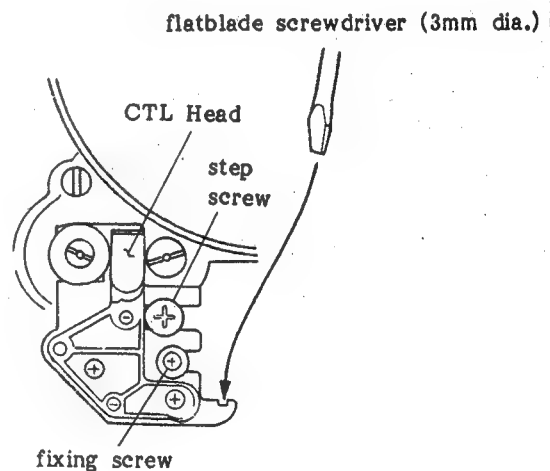
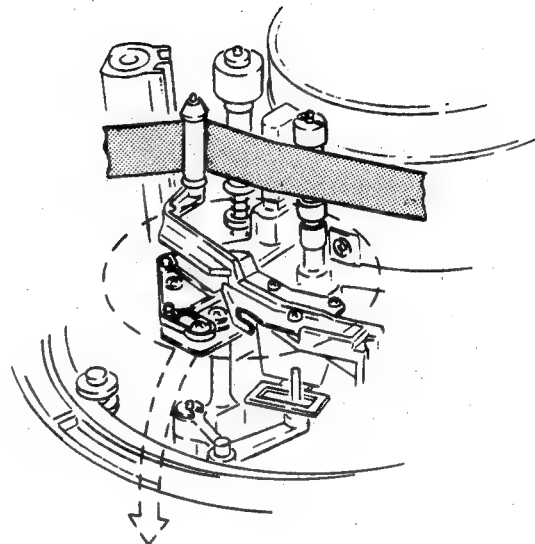
- (1) Short between TP2 and TP3 on the SV-99 Board with a short clip lead.  
(The servo H-Lock circuit is turned off.)
- (2) Connect the oscilloscope as follows:  
CH-1: TP4/DM-74 Board  
EXT. TRIG: TP14/DM-74 Board
- (3) Play back the alignment tape.

**Check procedure:**

- (1) While turning the TRACKING control knob, check that the RF envelope has the maximum amplitude at the FIXED position.

**Adjustment procedure:**

- (1) Loosen the fixing screw  $1/4$  to  $1/2$  turn.
- (2) Insert a flatblade screwdriver (3 mm dia.) into the hole of the CTL Head Base. Adjust the position of the CTL Head Block to meet the required specification.
- (3) After adjustment, perform Section 8-2-5, TC Head Position Adjustment.
- (4) Remove the short clip lead.



#### 8-4. T DRAWER GUIDE BLOCK TAPE RUN ADJUSTMENT

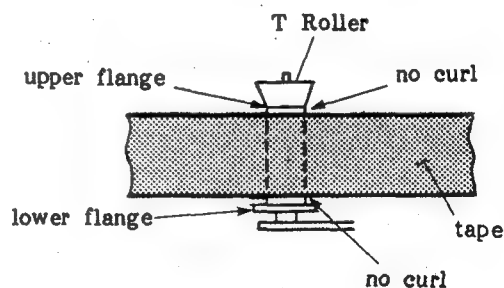
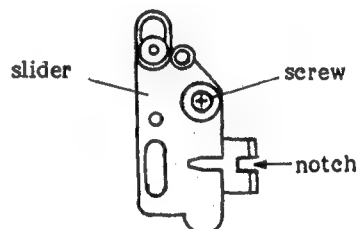
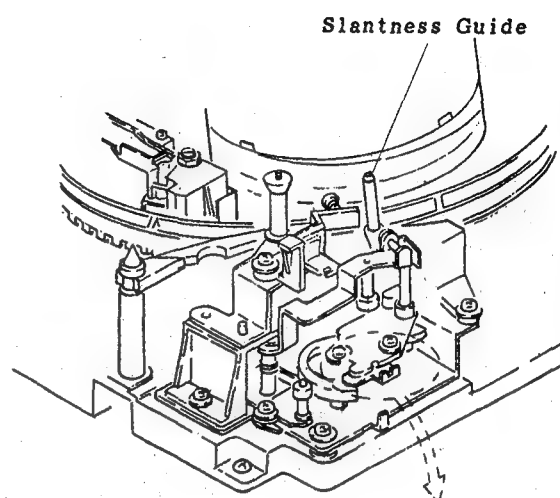
##### Check procedures:

- (1) Insert the BCT-20M cassette tape and press the PLAY button.
- (2) Check that the tape runs in the tape width direction before and behind a Slantness Guide without uneven tape tension.
- (3) Check that no tape curl occurs on the upper and lower flanges of the T Roller.
- (4) Press the F.FWD button.
- (5) Check that the tape runs and no tape curl occurs as described in procedures (2) and (3).
- (6) Press the REW button.
- (7) Check that the tape runs and no tape curl occurs as described in procedures (2) and (3).

##### Adjustment procedure:

- . When the upper edge of the tape slackens or the tape curl occurs on the upper flange.
  - (1) Loosen the fixing screw as shown in the figure.
  - (2) Insert the flatblade screwdriver into the notch and turn it moving counterclockwise.
- . When the lower edge of the tape slackens or the tape curl occurs on the lower flange.
  - (3) Loosen the fixing screw as shown in the figure.
  - (4) Insert the flatblade screwdriver into the notch and turn it moving clockwise.
  - (5) After adjustment, tighten the fixing screw and check again.

Note: To prevent a slider from damage, put your fingers under the slider when loosening or tightening the screw. Then, hold the screwdriver's force with your fingers.



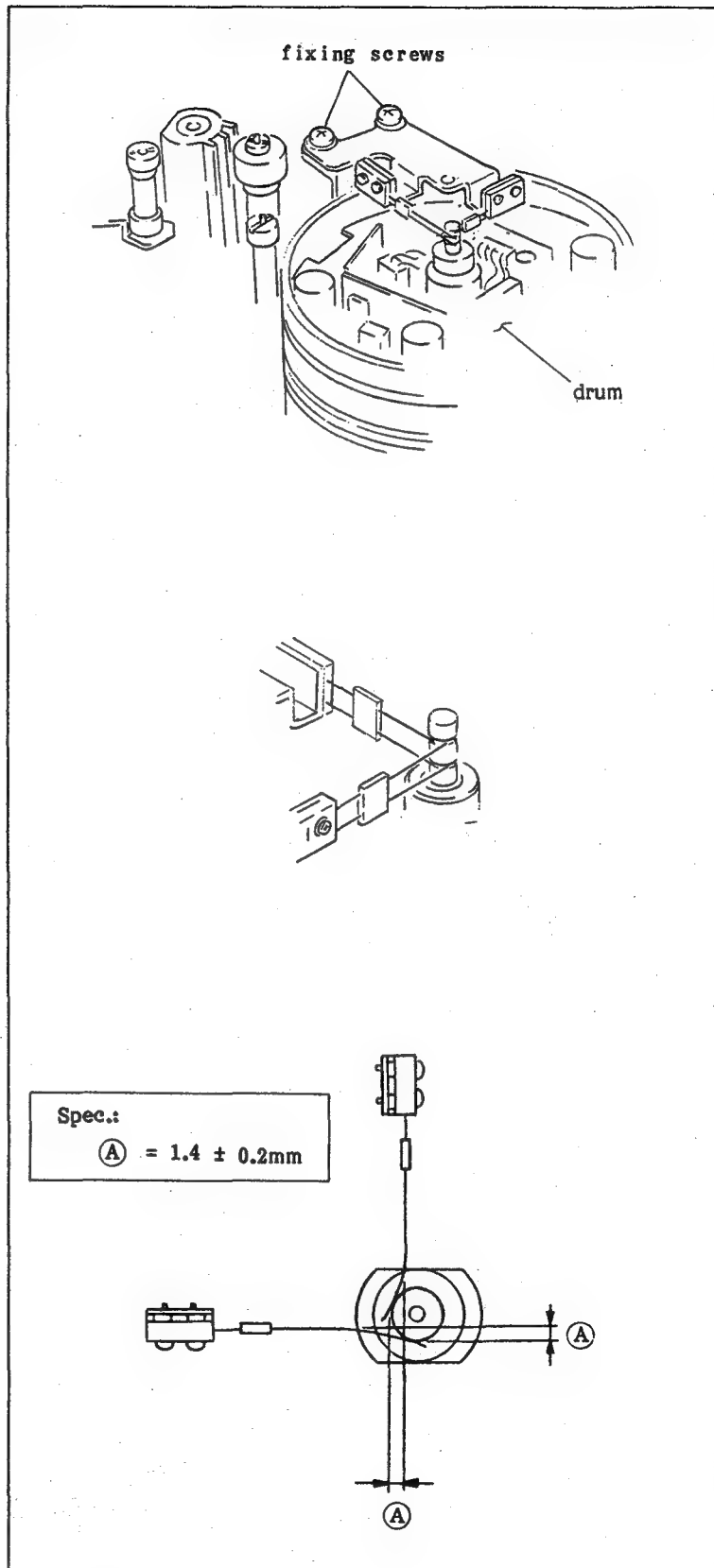
### 8-5. SLIP RING BRUSH POSITION ADJUSTMENT

#### Check procedure:

- (1) Check that the position of the brush and ring meets the required specification.
- (2) Check that the brush is in the groove of the ring as shown in the figure.

#### Adjustment procedure:

- (1) Remove the Brush Cover.
- (2) Loosen the fixing screws 1/2 to 1 turn.
- (3) Adjust the position of the brush so that it is in the groove of the ring and bending meets the required specification.
- (4) Tighten the fixing screws and check again.
- (5) Install the Brush Cover.



## SECTION 9 POWER SUPPLY AND SYSTEM CONTROL ALIGNMENT

### [Equipment Required]

- DC voltmeter
- Video monitor
- Oscilloscope
- IC clip(14pin)
- Alignment tape CR5-2A PS (96-0098-44)

### Contents

TIME min. sec	VIDEO TRACK
0: 00	75% Color Bars
3: 00	Multi Burst
6: 00	Bowtie & 10T
9: 00	Pulse & Bar
11: 00	Quad Phase
13: 00	C-Monoscope (Switching position is shifted.)
15: 00	

## 9-1. SWITCHING REGULATOR ADJUSTMENT

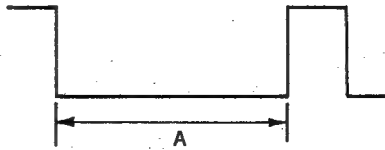
### 9-1-1. REG+12V Adjustment

Machine conditions for adjustment	Specifications	Adjustment
• Play back the color bar signal on the alignment tape CR5-2A PS.	CN201-1/UR-14E  $12.1 \pm 0.02V_{dc}$	RV651/UR-14E

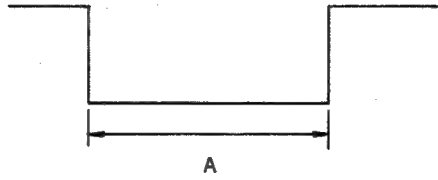
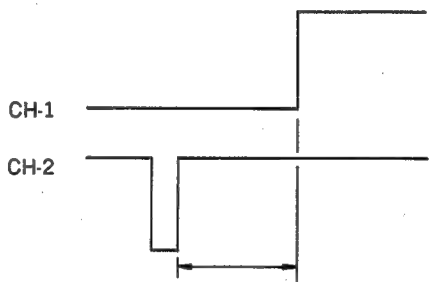
NOTE: If the REG 12V adjustment is attempted, re-alignment of the video system and servo system is required. Do not attempt adjustment of the REG 12V power supply unless the units performance is obviously poor due to incorrect power supply voltage. If adjustments are made to the power supply, re-alignment of the video and servo systems is necessary.

## 9-2. SYSTEM CONTROL ADJUSTMENT

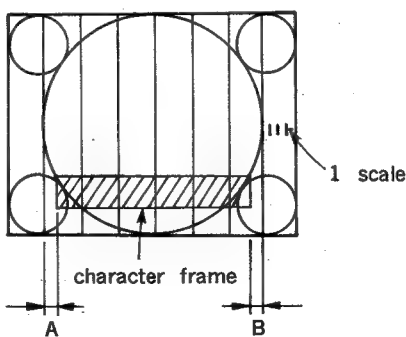
### 9-2-1. Half H Mute Pulse Width Adjustment

Machine conditions for adjustment	Specifications	Adjustment
• Play back the color bar signal on the alignment tape CR5-2A PS.	TP17/SY-121A(G-1)   $A = 50 \pm 2\mu\text{sec}$	RV2/SY-121A(H-1)

### 9-2-2. Character V Position Adjustment

Machine conditions for adjustment	Specifications	Adjustment
<ul style="list-style-type: none"> <li>Play back C-monoscope signal on the alignment tape CR5-2A PS.</li> </ul>	TP18/SY-121A(A-4)  $A = 700 \pm 10 \mu\text{sec}$ TRIG: TP9/SV-99(B-1)	● RV3/SY-121A(A-1)
	CH-1: TP18/SY-121A(A-4) CH-2: TP19/SY-121A(A-5)  $A = 16 \pm 1 \mu\text{sec}$ TRIG: TP9/SV-99(B-1)	

### 9-2-3. Character Position Adjustment

Machine conditions for adjustment	Specifications	Adjustment
<ul style="list-style-type: none"> <li>Connect a monitor to the VIDEO OUT connector.</li> <li>S3/SY-121A(B-1): LOWER</li> <li>Play back C-monoscope signal on the alignment tape CR5-2A PS.</li> <li>Press the SUPERIMPOSE button. (front panel)</li> </ul>	monitor  $A = B$ ( $A - B$ is less $1/4$ scale)	● CV1/SY-121A(A-4)
<ul style="list-style-type: none"> <li>S3/SY-121A(B-1): UPPER</li> </ul>	The character should be moved to the upper position. (Check that the character is not shifted, from the upper position, when the SEARCH FWD button is pressed.)	



## SECTION 10 SERVO SYSTEM ALIGNMENT

### [Equipment Required]

- DC voltmeter
- Oscilloscope
- Shorting clip
- Alignment tape CR2-1B PS (8-960-096-51)

### Contents

VIDEO TRACK	AUDIO TRACK	TIME CODE TRACK	CTL TRACK
Y; 6MHz signal C; 5MHz signal	Blank	CTL	CTL

- For the reel servo adjustment, refer to Section 6 Link and Drive System Alignment and Section 7 Torque System Alignment.

### RV1/SY-121A(C-1) 7.2. Reel Torque Adjustment

#### [Switch setting]

##### Front Panel

- TRACKING VR.....center clicked position

##### SY-121A Board

- S1(B-1) .....ON
- S2(E-1) .....S
- S3(B-1) .....UPPER

##### SV-99 Board

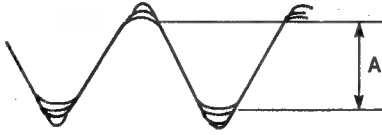
- S3(C-1) .....0
- S4(C-1) .....1

#### [Alignment Information]

How to put the unit into the PLAY mode without a cassette tape

- (1) Lift the Cassette-up Compartment from the unit.
- (2) Turn ON the POWER, and press the PLAY button. The threading ring rotates counterclockwise, and the threading ring rotation is stopped. Then the unit enters the PLAY mode. The pinch roller is pressed against the capstan shaft.

## 10-1. REEL FG ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• PLAY mode</li> </ul>	<p>S reel(A): TP28/SV-99(A-4)  S reel(B): TP29/SV-99(A-4)  T reel(A): TP30/SV-99(A-4)  T reel(B): TP31/SV-99(A-4)</p>  <p><math>A \geq 1V</math></p>	(check)

• When the specification is not satisfied, perform 6-1-5. Reel Table Rotation Detector Block Position Adjustment.




## 10-2. TENSION SENSOR APPLIED VOLTAGE ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• PLAY mode</li> <li>• DC voltmeter</li> </ul>	<p>TP6/SV-99(B-5)  GND: E1/SV-99(C-4)</p> <p><math>9 \pm 0.1Vdc</math></p>	<p>RV1/SV-99(C-5)</p>



## 10-3. TENSION SENSOR AMP OFFSET ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Connect TP26 on the SV-99 Board(B-5) to TP27 on the SV-99 Board(B-5) with a shorting clip.</li> <li>• PLAY mode</li> <li>• DC voltmeter</li> <li>• After the adjustment, remove the shorting clip.</li> </ul>	<p>TP23/SV-99(C-4)</p> <p><math>2.5 \pm 0.04Vdc</math></p>	<p>RV2/SV-99(C-4)</p>


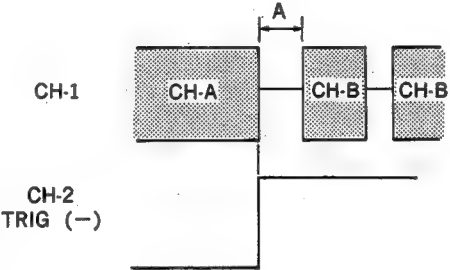
#### 10-4. CAPSTAN DRUM FREE SPEED ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<p>Step 1.</p> <ul style="list-style-type: none"> <li>• Connect TP11 on the SV-99 Board(B-2) to E2 on the SV-99 Board(C-2) with a shorting clip.</li> <li>• Press the S1 on the SV-99 Board(B-1) more than two seconds.</li> </ul>	<p>TIME COUNTER/HOURS METER DISPLAY (front panel)</p> <p>Adjustment item      Result of adjustment</p>  <p>Adjustment item to "AJ000"</p>	
<p>Step 2.</p> <ul style="list-style-type: none"> <li>• Insert the Alignment tape CR2-1B PS.</li> <li>• PLAY mode</li> <li>• Press the S1 on the SV-99 Board(B-1) one time.</li> </ul>	 <p>Adjustment item to "AJ001"</p>	
<p>Step 3.</p> <ul style="list-style-type: none"> <li>• Wait for more than ten seconds after the PLAY mode.</li> <li>• After the adjustment, press the S2 on the SV-99 Board(B-1) and remove the shorting clip.</li> </ul>	 <p>The result of adjustment should be "Gd".</p>	


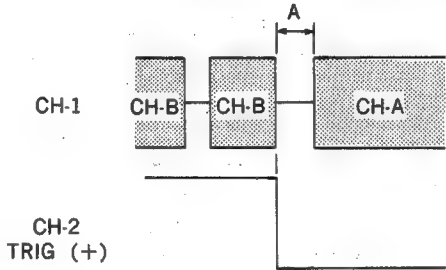
## 10-5. TRACKING CONTROL CENTER ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<p>Step 1.</p> <ul style="list-style-type: none"> <li>• Connect TP11 on the SV-99 Board(B-2) to E2 on the SV-99 Board(C-2) with a shorting clip.</li> <li>• Press the S1 on the SV-99 Board(B-1).</li> </ul>	<p>TIME COUNTER/HOURS METER DISPLAY (front panel)</p> <div style="text-align: center;"> <div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> <span>Adjustment item</span> <span>Result of adjustment</span> </div>  <p>Adjustment item to "AJ005"</p> </div>	
<p>Step 2.</p> <ul style="list-style-type: none"> <li>• Insert the Alignment tape CR2-1B PS.</li> <li>• Wait for more than five seconds after the PLAY mode.</li> <li>• After the adjustment, press the S2 on the SV-99 Board(B-1) and remove the shorting clip.</li> </ul>	<div style="text-align: center;">  <p>The result of adjustment should be "Gd".</p> </div>	

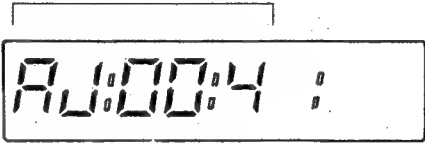
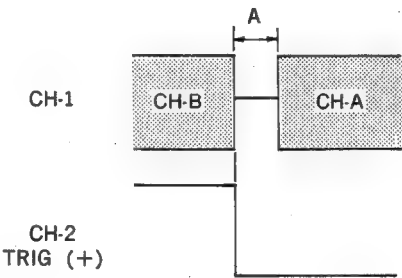
## 10-6. Y RF SWITCHING POSITION ADJUSTMENT (1)

Machine conditions for adjustment	Specifications	Adjustments
<p>Step 1.</p> <ul style="list-style-type: none"> <li>• Connect TP11 on the SV-99 Board(B-2) to E2 on the SV-99 Board(C-2) with a shorting clip.</li> <li>• Connect TP2 on the SV-99 Board (H-4) to TP3 on the SV-99 Board (H-5) with a shorting clip.</li> <li>• Press the S1 on the SV-99 Board(B-1).</li> </ul>	<p>TIME COUNTER/HOURS METER DISPLAY (front panel)</p> <p>Adjustment item</p>  <p>Adjustment item to "AJ002"</p>	
<p>Step 2.</p> <ul style="list-style-type: none"> <li>• Insert the Alignment tape CR2-1B PS.</li> <li>• PLAY mode</li> <li>• TRIG SLOPE: (—) side (oscilloscope)</li> <li>• After the adjustment, press the S2 on the SV-99 Board(B-1) one time and remove the shorting clip.</li> </ul>	<p>CH-1: TP4/DM-74(C-1) CH-2: TP14/DM-74(K-2)</p>  <p><math>A \leq 20\mu\text{sec}</math></p>	<p>● RV1/SY-121A(C-1)</p>

## 10-7. Y RF SWITCHING POSITION ADJUSTMENT (2)

Machine conditions for adjustment	Specifications	Adjustments
<p>Step 1.</p> <ul style="list-style-type: none"> <li>• Connect TP11 on the SV-99 Board(B-2) to E2 on the SV-99 Board(C-2) with a shorting clip.</li> <li>• Connect TP2 on the SV-99 Board (H-4) to TP3 on the SV-99 Board (H-5) with a shorting clip.</li> <li>• Press the S1 on the SV-99 Board(B-1).</li> </ul>	<p>TIME COUNTER/HOURS METER DISPLAY (front panel)</p> <p>Adjustment item</p>  <p>Adjustment item to "AJ003"</p>	
<p>Step 2.</p> <ul style="list-style-type: none"> <li>• Insert the Alignment tape CR2-1B PS.</li> <li>• PLAY mode</li> <li>• TRIG SLOPE: (+)side (oscilloscope)</li> <li>• After the adjustment, press the S2 on the SV-99 Board(B-1) one time and remove the shorting clip.</li> </ul>	<p>CH-1: TP4/DM-74(C-1) CH-2: TP14/DM-74(K-2)</p>  <p><math>A \leq 20\mu\text{sec}</math></p>	<p>● RV1/SY-121A(C-1)</p>

## 10-8. C RF SWITCHING POSITION ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<p>Step 1.</p> <ul style="list-style-type: none"> <li>• Connect TP11 on the SV-99 Board(B-2) to E2 on the SV-99 Board(C-2) with a shorting clip.</li> <li>• Connect TP2 on the SV-99 Board (H-4) to TP3 on the SV-99 Board (H-5) with a shorting clip.</li> <li>• Press the S1 on the SV-99 Board(B-1).</li> </ul>	<p>TIME COUNTER/HOURS METER DISPLAY (front panel)</p> <p>Adjustment item</p>  <p>Adjustment item to "AJ004"</p>	
<p>Step 2.</p> <ul style="list-style-type: none"> <li>• Insert the Alignment tape CR2-1B PS.</li> <li>• PLAY mode</li> <li>• TRIG SLOPE: (+)side (oscilloscope)</li> <li>• After the adjustment, press the S2 on the SV-99 Board(B-1) one time and remove the shorting clip.</li> </ul>	<p>CH-1: TP204/DM-74(B-3) CH-2: TP15/DM-74(K-1)</p>  <p><math>A \leq 20 \mu\text{sec}</math></p>	<p>● RV1/SY-121A(C-1)</p>





## SECTION 11 AUDIO SYSTEM ALIGNMENT

### [Equipment Required]

- AC voltmeter
- Frequency counter
- Dual-trace oscilloscope
- Shorting clip
- Alignment tape CR8-1A PS (96-0098-45)

### Contents

TIME min. sec	AUDIO TRACK
0: 00	1kHz, 0VU
2: 55	Blank
3: 00	
	10kHz, -10VU
4: 55	Blank
5: 00	
	1kHz, -20VU
5: 55	Blank
6: 00	
	40Hz 7kHz 10kHz 15kHz
7: 55	Blank
8: 00	
	1kHz, 0VU AUDIO CH-1, CH-2 CTL
10: 00	

- Alignment tape CR5-1B PS (8-960-096-91)

### Contents

TIME min. sec	VIDEO TRACK	AFM
0: 00	RF Sweep	No-Signal
2: 00	60% H Sweep (CTDM)	
5: 00		
8: 00	Pulse & Bar (CTDM)	
11: 00	Multi Sweep	
14: 00	Pulse & Bar	
16: 30		
17: 00	100% Color Bars	400 Hz SINE WAVE 25 kHz DEVIATION
		75 kHz DEVIATION
19: 00	Bowtie & 10T	No-Signal
22: 00	Line 17A Signal	
24: 00	Quad Phase	
26: 00	Flat Field	
28: 00	100% Color Bar with Dropout	
30: 00	Composite H Sweep with VISC	

## 11-1. LNG LEVEL TENTATIVE ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back 1kHz, 0dB signal on the alignment tape CR8-1A PS.</li> </ul>	CH-1: TP102/AU-101A(L-2) CH-2: TP202/AU-101A(M-2)  $-10 \pm 2\text{dBs}$	CH-1: ⌚ RV103/AU-101A(K-3) CH-2: ⌚ RV203/AU-101A(N-4)

## 11-2. FREQUENCY RESPONSE ADJUSTMENT

### Step 1.

Machine conditions for adjustment	Specifications	Adjustments												
<ul style="list-style-type: none"><li>• DOLBY NR button: OFF</li><li>• Play back 40Hz, 1kHz, 7kHz, 10kHz and 15kHz signal on the alignment tape CR8-1A PS.</li><li>• After the adjustment, return the DOLBY NR button to ON.</li></ul>	<p>CH-1: AUDIO OUT connector (terminated at 47k ohm) CH-2: AUDIO OUT connector (terminated at 47k ohm)</p> <table><tr><th>Frequency</th><th>Level</th></tr><tr><td>40Hz</td><td>Reference±2.7dB</td></tr><tr><td>1kHz</td><td>Reference</td></tr><tr><td>7kHz</td><td>Reference±0.3dB</td></tr><tr><td>10kHz</td><td>Reference±0.5dB</td></tr><tr><td>15kHz</td><td>Reference±0.7dB</td></tr></table> <p>• If the specification is not satisfied, proceed to the Step 2.</p>	Frequency	Level	40Hz	Reference±2.7dB	1kHz	Reference	7kHz	Reference±0.3dB	10kHz	Reference±0.5dB	15kHz	Reference±0.7dB	<ul style="list-style-type: none"><li>• 7kHz Adjustment CH-1: ⌚ RV102/AU-101A(L-5) CH-2: ⌚ RV202/AU-101A(M-5)</li><li>• 10kHz, 15kHz Adjustment CH-1: ⌚ RV101/AU-101A(L-6) CH-2: ⌚ RV201/AU-101A(M-6)</li></ul>
Frequency	Level													
40Hz	Reference±2.7dB													
1kHz	Reference													
7kHz	Reference±0.3dB													
10kHz	Reference±0.5dB													
15kHz	Reference±0.7dB													

**Step 2. When the specification in high-frequency level is not satisfied.**

Machine conditions for adjustment	Specifications	Adjustments												
	<p>CH-1:</p> <p>After the set S101 on the AU-101A Board(L-6) to Table 1 and perform Step 1.</p> <p>CH-2:</p> <p>After the set S201 on the AU-101A Board (M-1) to Table 1 and perform Step 1.</p> <p style="text-align: center;">High-Frequency level HIGH ← → LOW</p> <table><tr><td>S101/S201</td><td>①</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr><tr><td>Setting</td><td>②</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr></table> <p style="text-align: center;">↑ STANDARD SETTING Table 1</p> <div><div>CH-2</div><div>EO15KHz S201 ON OFF ① ②</div><div>PB AMP 5 CH1</div><div>EO15KHz S101 ON OFF ① ②</div><div>CH-1</div></div> <p style="text-align: center;">AU-101A Board</p> <p>[NOTE]</p> <p>S101 and S201 should be same setting for preventing the phase shift.</p>	S101/S201	①	OFF	OFF	ON	ON	Setting	②	OFF	ON	OFF	ON	
S101/S201	①	OFF	OFF	ON	ON									
Setting	②	OFF	ON	OFF	ON									

### 11-3. LNG LEVEL ADJUSTMENT

**Step 1.**

Machine conditions for adjustment	Specifications	Adjustments
• Play back 1kHz, 0dB signal on the alignment tape CR8-1A PS.	<p>CH-1: TP102/AU-101A(L-2) CH-2: TP202/AU-101A(M-2)</p> <p style="text-align: center;">-10±0.2dBs</p>	<p>CH-1: ● RV103/AU-101A(K-3) CH-2: ● RV203/AU-101A(N-4)</p>

**Step 2.**

Machine conditions for adjustment	Specifications	Adjustments
• Play back 1kHz, 0dB signal on the alignment tape CR8-1A PS.	<p>CH-1: AUDIO OUT connector (terminated at 47k ohm) CH-2: AUDIO OUT connector (terminated at 47k ohm)</p> <p style="text-align: center;">-10±0.5dBs</p>	<p>CH-1: ● RV104/AU-101A(H-5) CH-2: ● RV204/AU-101A(H-5)</p>

#### 11-4. AFM CARRIER FREQUENCY ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Connect as follows with shorting clips. TP303/AU-101A(B-3)→ TP312/AU-101A(E-1) TP308/AU-101A(D-3)→ TP312/AU-101A(E-1)</li> </ul>	TP302/AU-101A(B-4)  $310 \pm 3\text{kHz}$	CH-1: ⚙ RV301/AU-101A(C-3)
<ul style="list-style-type: none"> <li>PLAY mode</li> <li>After the adjustment, remove the shorting clips.</li> </ul>	TP307/AU-101A(E-4)  $540 \pm 3\text{kHz}$	CH-2: ⚙ RV304/AU-101A(E-3)

#### 11-5. AFM LEVEL ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Paly back 400Hz, 25kHz Deviation signal (color bar) on the alignment tape CR5-1B PS.</li> </ul>	CH-1: AUDIO OUT connector (terminated at 47kohm) CH-2: AUDIO OUT connector (terminated at 47kohm)  $-10 \pm 0.2\text{dBs}$	CH-1: ⚙ RV303/AU-101A(B-3) CH-2: ⚙ RV305/AU-101A(C-3)

## SECTION 12 VIDEO SYSTEM ALIGNMENT

### [Equipment Required]

- Dual trace oscilloscope
- Frequency counter
- PAL signal generator (TEKTRONIX 1411 or equivalent)
- Sweep generator
- Vectorscope
- Waveform monitor
- Shorting clip
- Alignment tape CR5-2A PS (96-0098-44)

### Contents

TIME min. sec	VIDEO TRACK
0: 00	75% Color Bars
3: 00	Multi Burst
6: 00	Bowtie & 10T
9: 00	Pulse & Bar
11: 00	Quad Phase
13: 00	C-Monoscope (Switching position is shifted.)
15: 00	

- Alignment tape CR5-1B PS (8-960-096-91)

### Contents

TIME min. sec	VIDEO TRACK	AFM
0: 00	RF Sweep	No-Signal
2: 00		
	60% H Sweep (CTDM)	
5: 00		
	Pulse & Bar (CTDM)	
8: 00		
	Multi Sweep	No-Signal
11: 00		
	Pulse & Bar	
14: 00		
	100% Color Bars	
16: 30		400 Hz SINE WAVE 25 kHz DEVIATION
17: 00		75 kHz DEVIATION
	Bowtie & 10T	No-Signal
19: 00		
	Line 17A Signal	
22: 00		
	Quad Phase	
24: 00		
	Flat Field	No-Signal
26: 00		
	100% Color Bar with Dropout	
28: 00		
30: 00	Composite H Sweep with VISC	

## [Switch Setting]

### Front Panel

- HEADPHONE VR .....fully counterclockwise
- TRACKING VR .....center clicked position
- AUDIO MONITOR switch .....MIX
- LNG/AFM switch .....LNG
- DOLBY NR button .....OFF
- SUPERIMPOSE button .....OFF
- CTL/TC/U-BIT switch .....TC

### DM-74 Board

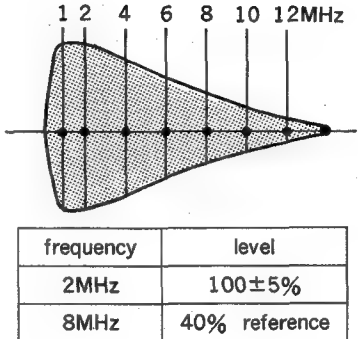
- S2(C-1) .....ON
- S3(D-2) .....ON
- S201(E-6) .....ON
- S202(C-4) .....ON

### EN-66A Board

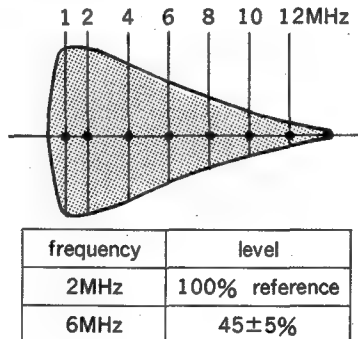
- S1(K-7) .....ON
- S2(J-3) .....ON
- S301(K-2) .....ON
- S303(G-6) .....ON
- S304(K-2) .....ON
- S305(H-1) .....ON
- S306(F-2) .....DOUBLE

These switches should not be touched unless otherwise specified.

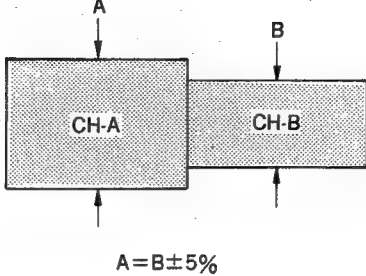
## 12-1 Y RF EQUALIZER ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Connect TP2 on the SV-99 Board(H-4) to TP3 on the SV-99 Board(H-5) with a shorting clip.</li> <li>Play back the RF sweep signal on the alignment tape CR5-1B PS.</li> <li>After the adjustment, remove the shorting clip.</li> </ul>	<p>TP4/DM-74(C-1)</p>  <p>frequency      level</p> <p>2MHz      100±5%</p> <p>8MHz      40% reference</p> <p>TRIG: TP14/DM-74(K-2)</p> <p>[NOTE] When the saturation is generated near the 1MHz, Adjust RV15 on the DM-74 Board(A-3).</p>	<p>CH-A: ● RV1/DM-74(B-2)</p> <p>CH-B: ● RV2/DM-74(C-3)</p> <p>CH-A SLOPE (—) CH-B SLOPE (+)</p>

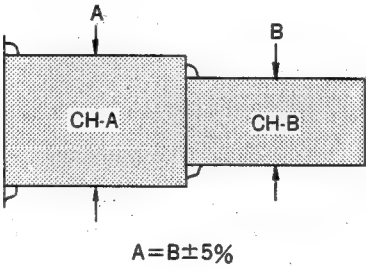
## 12-2. CHROMA RF EQUALIZER ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Connect TP2 on the SV-99 Board(H-4) on the SV-99 Board (H-5) with a shorting clip.</li> <li>Play back the RF sweep signal on the alignment tape CR5-1B PS.</li> <li>After the adjustment, remove the shorting clip.</li> </ul>	<p>TP204/DM-74(B-3)</p>  <p>frequency      level</p> <p>2MHz      100% reference</p> <p>6MHz      45±5%</p> <p>TRIG: TP14/DM-74(K-2)</p> <p>[NOTE] When the saturation is generated near the 1MHz, Adjust RV212 on the DM-74 Board(A-5).</p>	<p>CH-A: ● RV201/DM-74(A-5)</p> <p>CH-B: ● RV202/DM-74(B-5)</p> <p>CH-A SLOPE (—) CH-B SLOPE (+)</p>

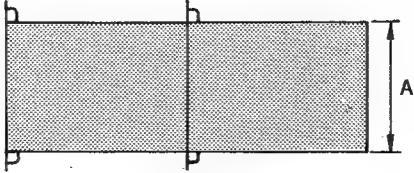
### 12-3 CHROMA RF BALANCE TENTATIVE ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the flat field signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP204/DM-74(B-3)</p>  <p><math>A = B \pm 5\%</math></p> <p>TRIG: TP14/DM-74(K-2)</p>	<p>RV203/DM-74(B-4)</p>

### 12-4 Y RF BALANCE TENTATIVE ADJUSTMENT

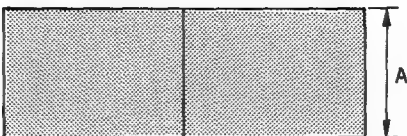
Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the flat field signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP4/DM-74(C-1)</p>  <p><math>A = B \pm 5\%</math></p> <p>TRIG: TP14/DM-74(K-2)</p>	<p>RV3/DM-74(C-2)</p>

### 12-5 Y RF AGC HF INPUT ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the flat field signal on the alignment tape CR5-1B PS.</li> <li>Maximize the RF level with the TRACKING control VR.</li> </ul>	<p>TP7/DM-74(D-1)</p>  <p><math>A = 0.2 \pm 0.02V</math></p> <p>TRIG: TP14/DM-74(K-2)</p>	<p>RV4/DM-74(C-3)</p>

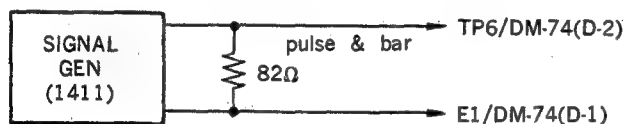


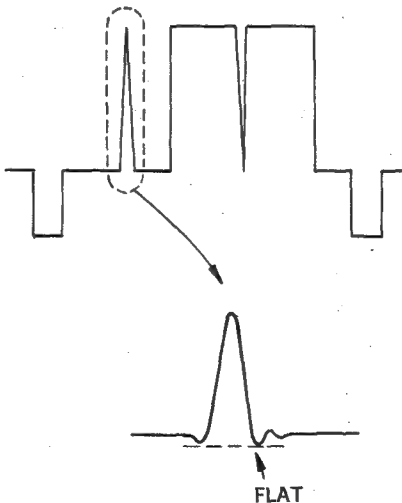
## 12-6 CHROMA RF AGC HF INPUT ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the flat field signal on the alignment tape CR5-1B PS.</li> <li>• Maximize the RF level with the TRACKING control VR.</li> </ul>	<p>TP207/DM-74(D-5)</p>  <p><math>A = 0.25 \pm 0.02V</math></p> <p>TRIG: TP14/DM-74(K-2)</p>	<p>RV204/DM-74(C-6)</p>

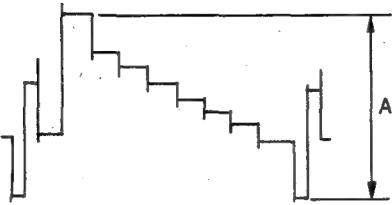
## 12-7. Y PHASE EQUALIZER ADJUSTMENT

[Connection]

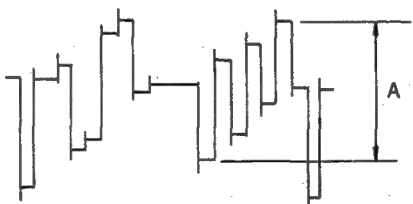


Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• S3/DM-74(D-2): OFF</li> <li>• Connect the SIGNAL GEN described above, and supply the T/2 pulse &amp; 2T bar signal.</li> <li>• After the adjustment, set S3 to the ON position.</li> </ul>	<p>TP7/DM-74(D-1)</p> 	<p>RV5/DM-74(D-1)</p>

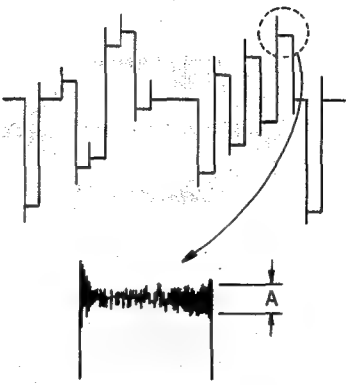
## 12-8. Y LEVEL ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<p>Step 1.</p> <ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-2A PS.</li> </ul>	<p>TP12/DM-74(J-2)</p>  <p>Oxide mode: <math>A=1.0\pm0.01</math>  Metal mode: <math>A=1.0\pm0.01</math>  (Measured in the noise center)</p>	<p>Oxide mode  ● RV16/DM-74(H-1)  Metal mode  ● RV17/DM-74(G-3)</p>
<p>Step 2.</p> <ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>		

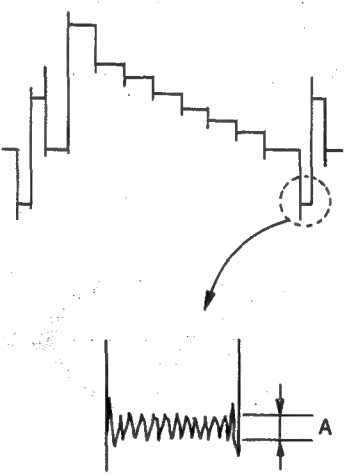
## 12-9. CHROMA LEVEL ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP212/DM-74(G-6)</p>  <p><math>A=0.93\pm0.01V</math>  (Measured in the noise center)</p>	<p>● RV209/DM-74(G-4)</p>

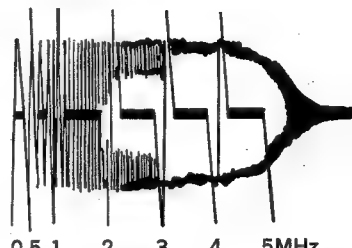
## 12-10. CHROMA CARRIER BALANCE ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-2A PS.</li> </ul>	<p>TP212/DM-74(G-6)</p>  <p>Minimize the carrier leak (<math>A \leq 70\text{mV}</math>)</p>	<p>● RV205/DM-74(D-6)</p>

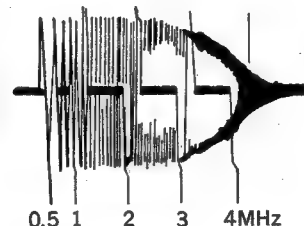
## 12-11. Y CARRIER BALANCE ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-2A PS.</li> </ul>	<p>TP12/DM-74(J-2)</p>  <p>Minimize the carrier leak (<math>A \leq 70\text{mV}</math>)</p>	<p>● RV6/DM-74(D-1)</p>

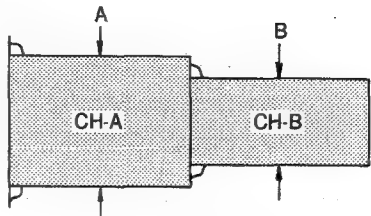
## 12-12. Y FREQUENCY RESPONSE ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments														
<ul style="list-style-type: none"><li>• Play back the 60% H sweep (CTDM) signal on the alignment tape CR5-1B PS.</li></ul>	<p>TP12/DM-74(J-2)</p> <p>Spec 1.</p>  <p>0.5 1 2 3 4 5MHz</p> <table><tr><th>frequency</th><th>level</th></tr><tr><td>0.5MHz</td><td>100% reference</td></tr><tr><td>1MHz</td><td>100±3%</td></tr><tr><td>2MHz</td><td>100±5%</td></tr><tr><td>3MHz</td><td>95±7%</td></tr><tr><td>4MHz</td><td>90±10%</td></tr><tr><td>5MHz</td><td>75±10%</td></tr></table>	frequency	level	0.5MHz	100% reference	1MHz	100±3%	2MHz	100±5%	3MHz	95±7%	4MHz	90±10%	5MHz	75±10%	<p>CH-A:</p> <p>● RV1/DM-74(B-3)</p> <p>CH-B:</p> <p>● RV2/DM-74(C-3)</p>
frequency	level															
0.5MHz	100% reference															
1MHz	100±3%															
2MHz	100±5%															
3MHz	95±7%															
4MHz	90±10%															
5MHz	75±10%															
	<p>Spec 2. The difference between the CH-A and CH-B should be within 5% at 4MHz</p> <p>TRIG: TP14/DM-74(K-2)</p>															

## 12-13. CHROMA FREQUENCY RESPONSE ADJUSTMENT

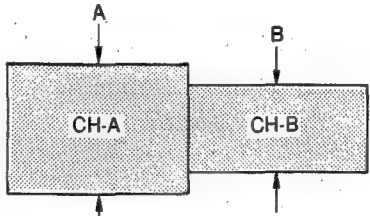
Machine conditions for adjustment	Specifications	Adjustments										
<ul style="list-style-type: none"><li>• Play back the 60% H sweep (CTDM) signal on the alignment tape CR5-1B PS.</li></ul>	<p>TP212/DM-74(G-6)</p> <p>Spec 1.</p>  <p>0.5 1 2 3 4MHz</p> <table><tr><th>frequency</th><th>level</th></tr><tr><td>0.5MHz</td><td>100% reference</td></tr><tr><td>1MHz</td><td>100±5%</td></tr><tr><td>2MHz</td><td>95±7%</td></tr><tr><td>3MHz</td><td>90±10%</td></tr></table> <p>Spec 2. The difference between the CH-A and CH-B should be within 5% at 3MHz</p> <p>TRIG: TP14/DM-74(K-2)</p>	frequency	level	0.5MHz	100% reference	1MHz	100±5%	2MHz	95±7%	3MHz	90±10%	<p>CH-A:</p> <p>● RV201/DM-74(A-5)</p> <p>CH-B:</p> <p>● RV202/DM-74(B-5)</p>
frequency	level											
0.5MHz	100% reference											
1MHz	100±5%											
2MHz	95±7%											
3MHz	90±10%											

## 12-14. Y RF BALANCE ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the flat field signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP4/DM-74(C-1)</p>  <p><math>A=B\pm 5\%</math> TRIG: TP14/DM-74(K-2)</p>	<p>RV3/DM-74(C-2)</p>

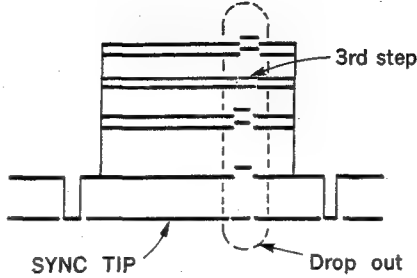
- After the adjustment, perform the 12-12. Y Frequency Response Adjustment.

## 12-15. CHROMA RF BALANCE ADJUSTMENT

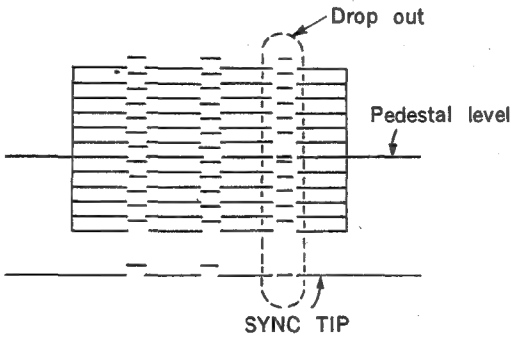
Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the flat field signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP204/DM-74(B-3)</p>  <p><math>A=B\pm 5\%</math> TRIG: TP14/DM-74(K-2)</p>	<p>RV203/DM-74(B-4)</p>

- After the adjustment, perform the 12-13. Chroma Frequency Response Adjustment.

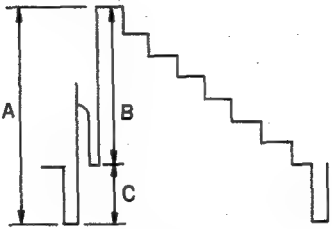
## 12-16. Y DROP OUT REPLACEMENT ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the drop out check signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP12/DM-74(J-2)</p>  <p>Spec 1: Adjust the level of SYNC TIP. Spec 2: Adjust the 3rd step at the dropout portion.</p> <p>TRIG: TP14/DM-74(K-2)</p>	<p>Spec 1: ● RV12/DM-74(J-1) Spec 2: ● RV13/DM-74(K-4)</p>

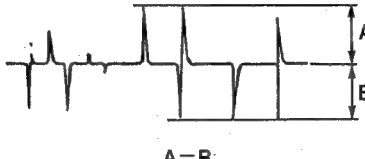
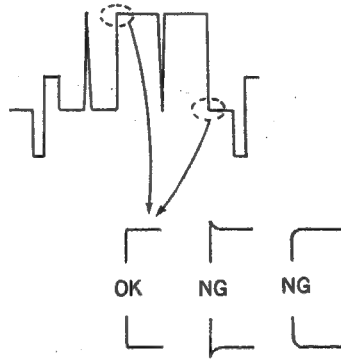
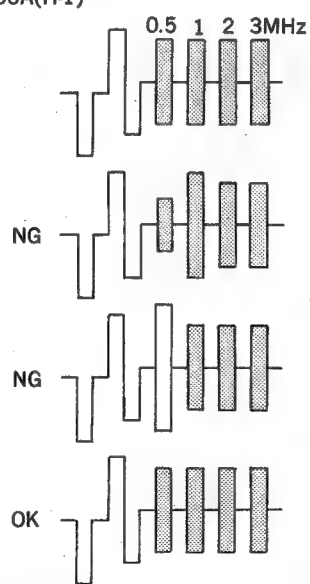
## 12-17. CHROMA DROP OUT REPLACEMENT ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the drop out check signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP212/DM-74(G-6)</p>  <p>Spec 1: Adjust the level of SYNC TIP. Spec 2: Adjust the level of drop out.</p> <p>TRIG: TP14/DM-74(K-2)</p>	<p>Spec 1: ● RV210/DM-74(H-6) Spec 2: ● RV211/DM-74(I-6)</p>

## 12-18. Y INPUT SIGNAL ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP309/EN-66A(K-2) GND: E301/EN-66A(I-1)</p>  <p> <math>A = 1 \pm 0.04V</math>  <math>B = 700 \pm 20mV</math>  <math>C = 300 \pm 20mV</math> </p>	

## 12-19. Y NONLINEAR DE-EMPHASIS ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments								
<p>Step 1.</p> <ul style="list-style-type: none"><li>• Play back the pulse &amp; bar signal on the alignment tape CR5-1B PS.</li></ul>	<p>IC319-4pin/EN-66A(J-2)</p>  <p>A=B</p>	<p>● RV331/EN-66A(J-2)</p>								
<p>Step 2.</p> <ul style="list-style-type: none"><li>• Play back the pulse &amp; bar signal on the alignment tape CR5-1B PS.</li></ul>	<p>TP310/EN-66A(J-2)</p>  <p>OK NG NG</p>	<p>● RV304/EN-66A(K-1)</p>								
<p>Step 3.</p> <ul style="list-style-type: none"><li>• Play back the multi burst signal on the alignment tape CR5-1B PS.</li></ul>	<p>TP325/EN-66A(H-1)</p>  <table border="1" data-bbox="612 1823 946 1980"><thead><tr><th>frequency</th><th>level</th></tr></thead><tbody><tr><td>0.5MHz</td><td>100%reference</td></tr><tr><td>1MHz</td><td>100±3%</td></tr><tr><td>3MHz</td><td>95±7%</td></tr></tbody></table>	frequency	level	0.5MHz	100%reference	1MHz	100±3%	3MHz	95±7%	
frequency	level									
0.5MHz	100%reference									
1MHz	100±3%									
3MHz	95±7%									

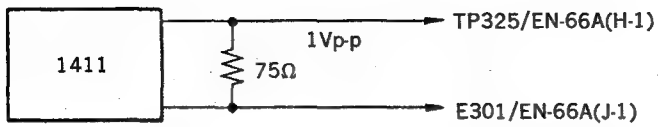


## 12-20. Y NOISE CANCELLER ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments								
<p>Step 1.</p> <p>• Play back the pulse &amp; bar signal on the alignment tape CR5-1B PS.</p>	<p>TP325/EN-66A(H-1)</p> <p>Minimize the noise.</p>	<p>● RV306/EN-66A(I-2)</p>								
<p>Step 2.</p> <p>• Play back the pulse &amp; bar signal on the alignment tape CR5-1B PS.</p>	<p>TP325/EN-66A(H-1)</p> <p>OK NG NG</p>	<p>● RV305/EN-66A(I-2)</p>								
<p>Step 3.</p> <p>• Play back the multi burst signal on the alignment tape CR5-1B PS.</p>	<p>TP325/EN-66A(H-1)</p> <p>0.5 1 2 3MHz</p> <table><thead><tr><th>frequency</th><th>level</th></tr></thead><tbody><tr><td>0.5MHz</td><td>100%reference</td></tr><tr><td>1MHz</td><td>100±3%</td></tr><tr><td>3MHz</td><td>95±7%</td></tr></tbody></table>	frequency	level	0.5MHz	100%reference	1MHz	100±3%	3MHz	95±7%	
frequency	level									
0.5MHz	100%reference									
1MHz	100±3%									
3MHz	95±7%									

## 12-21. Y DOUBLE NOISE CANCELLER ADJUSTMENT

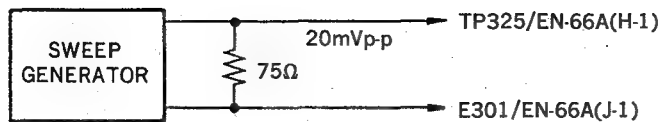
[Connection]



### Step 1.

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• S305/EN-66A(H-1): OFF</li> <li>• S306/EN-66A(F-2): DOUBLE</li> <li>• Connect the PAL signal generator described above, and supply the 2T pulse &amp; bar signal.</li> <li>• Turn the RV329 on the EN-66A Board(G-2) fully clockwise direction.</li> </ul>	<p>TP311/EN-66A(E-2)</p> <p>NG OK NG</p> <p>the same level</p>	<p>● RV328/EN-66A(G-2)</p>

[Connection]



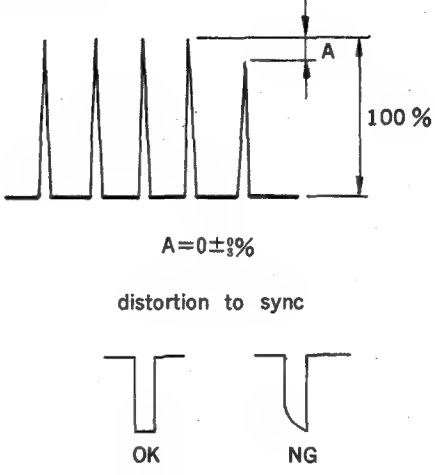
## Step 2.

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>S305/EN-66A(H-1): OFF</li> <li>S306/EN-66A(F-2): DOUBLE</li> <li>Connect the SWEEP GEN described above, and supply the V SWEEP signal.</li> <li>EJECT mode</li> <li>Turn the RV330 on the EN-66A Board(G-2) fully clock-wise direction.</li> <li>After the adjustment, S305/EN-66A (H-1): ON</li> </ul>	<p>TP311/EN-66A(E-2)</p> <p><math>B = \frac{A}{2}</math></p>	<p>RV329/EN-66A(G-2)</p>

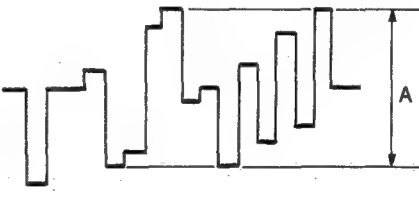
## 12-22. Y SINGLE/DOUBLE NOISE CANCELLER OUTPUT ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<p>Step 1.</p> <ul style="list-style-type: none"> <li>Play back the color bar signal on the alignment tape CR5-1B PS.</li> <li>S306/EN-66A(F-2): SINGLE</li> </ul> <p>Step 2.</p> <ul style="list-style-type: none"> <li>S306/EN-66A(F-2): DOUBLE</li> </ul>	<p>TP311/EN-66A(E-2)</p> <p>SINGLE : <math>A = 1.0 \pm 0.02V</math> DOUBLE : <math>A = 1.0 \pm 0.02V</math></p>	<p>SINGLE: RV307/EN-66A(I-2) DOUBLE: RV330/EN-66A(G-2)</p>

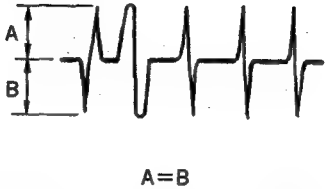
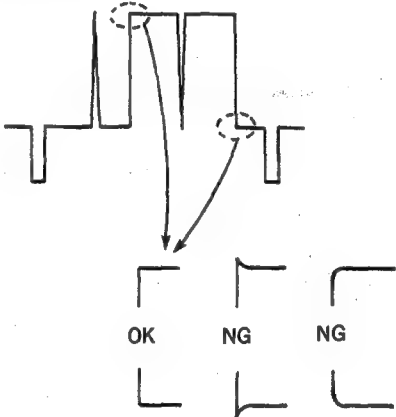
### 12-23. PRE- $\phi$ CCD LINEARITY ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the Quad Phase signal on the alignment tape CR5-1B PS.</li> <li>• WAVEFORM MONITOR: DIFF'D STEP mode</li> </ul>	<p>TP2/EN-66A(K-7)</p>  <p><math>A = 0 \pm 1\%</math></p> <p>distortion to sync</p> <p>OK NG</p>	<p>RV1/EN-66A(K-4)</p>

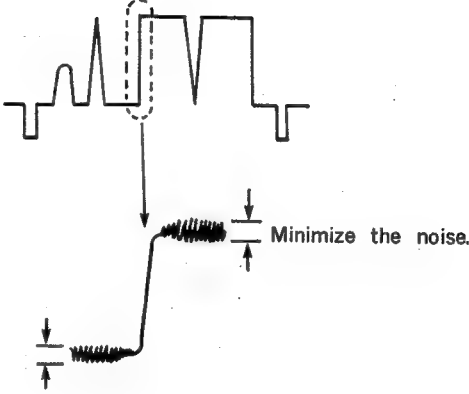
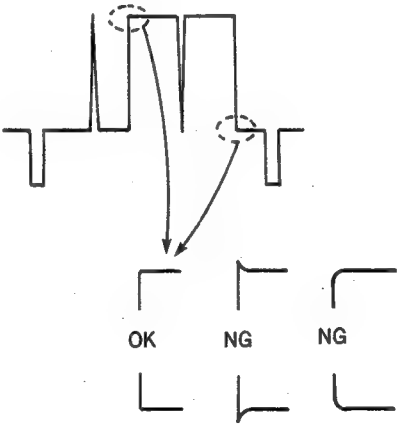
### 12-24. PRE- $\phi$ CCD OUTPUT LEVEL ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP2/EN-66A(K-7)</p>  <p><math>A = 0.93 \pm 0.02V</math></p>	<p>RV2/EN-66A(J-7)</p>

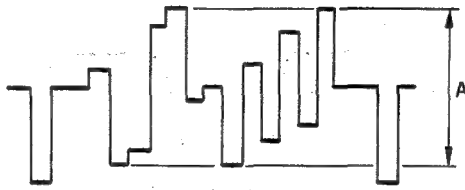
## 12-25. CHROMA NONLINEAR DE-EMPHASIS ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<p>Step 1.</p> <ul style="list-style-type: none"> <li>• Play back the color bar on the alignment tape CR5-1B PS.</li> </ul>	<p>IC4-4Pin/EN-66A(K-8)</p>  <p>A=B</p>	<p>● RV25/EN-66A(K-8)</p>
<p>Step 2.</p> <ul style="list-style-type: none"> <li>• Play back the pulse &amp; bar signal on the alignment tape CR5-2A PS.</li> </ul>	<p>TP3/EN-66A(K-7)</p>  <p>OK NG NG</p>	<p>● RV3/EN-66A(J-7)</p>

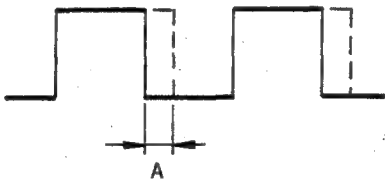
## 12-26. CHROMA NOISE CANCELLER ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<p>Step 1.</p> <ul style="list-style-type: none"> <li>• Play back the pulse &amp; bar signal on the alignment tape CR5-2A PS.</li> </ul>	<p>TP16/EN-66A(K-6)</p> 	<p>● RV5/EN-66A(K-8)</p>
<p>Step 2.</p> <ul style="list-style-type: none"> <li>• Play back the pulse &amp; bar signal on the alignment tape CR5-2A PS.</li> </ul>	<p>TP16/EN-66A(K-6)</p> 	<p>● RV4/EN-66A(K-9)</p>

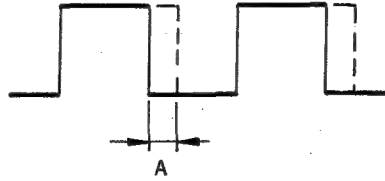
## 12-27. CHROMA NOISE CANCELLER OUTPUT LEVEL ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	TP16/EN-66A(K-6)  $A = 0.93 \pm 0.02V$	● RV6/EN-66A(K-8)

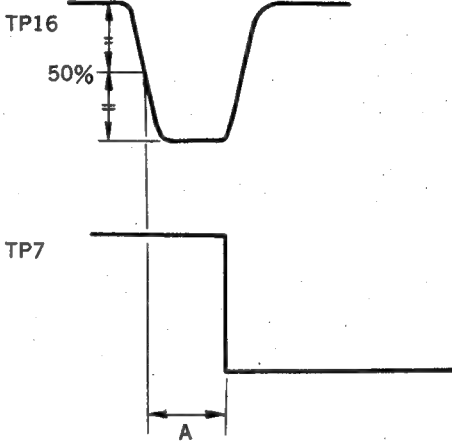
## 12-28. CHROMA AFC 1/8 CLOCK ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	TP11/EN-66A(F-10)  Minimize the clock deflection. $A = 0 \pm 20nsec$	● RV12/EN-66A(H-10)

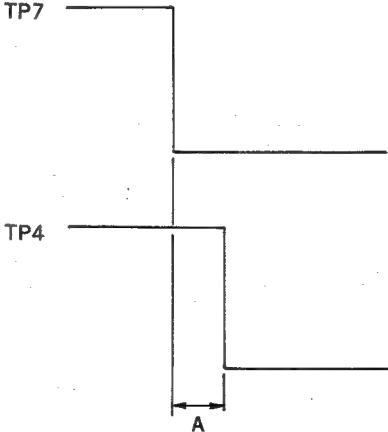
## 12-29. Y AFC 1/8 CLOCK ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	TP10/EN-66A(F-11)  Minimize the clock deflection. $A = 0 \pm 20nsec$	● RV13/EN-66A(H-12)

### 12-30. PRE- $\phi$ CHROMA SH ADJUSTMENT

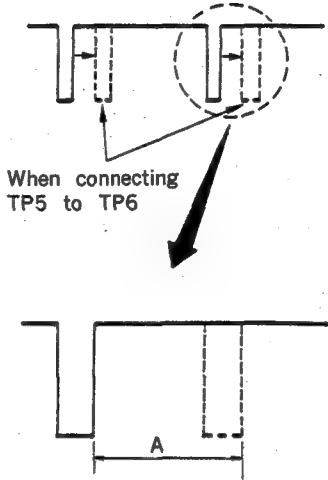
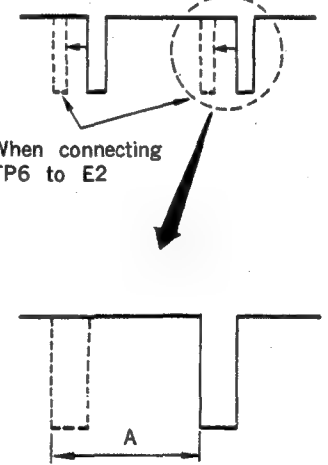
Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>CH-1: TP16/EN-66A(K-6) CH-2: TP7/EN-66A(J-10)</p>  <p><math>A = 2.3 \pm 0.04 \mu\text{sec}</math></p>	<p>RV10/EN-66A(K-11)</p>

### 12-31. PRE- $\phi$ Y SH ADJUSTMENT

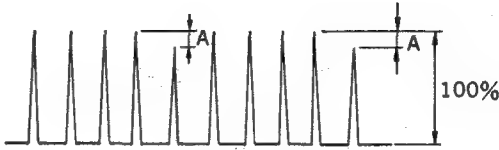

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>CH-1: TP7/EN-66A(J-10) CH-2: TP4/EN-66A(J-10)</p>  <p><math>A = 0.85 \pm 0.05 \mu\text{sec}</math></p>	<p>RV7/EN-66A(H-8)</p>



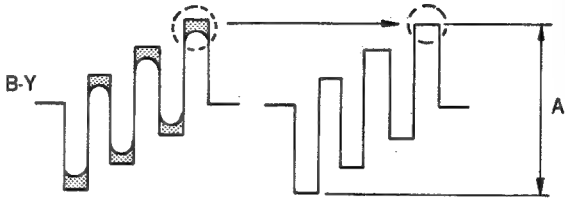
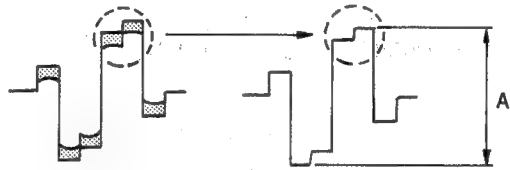
## 12-32. PRE- $\phi$ LIMITER ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<p>Step 1.</p> <ul style="list-style-type: none"> <li>• Connect TP5 on the EN-66A Board(H-7) to TP6 on the EN-66A Board(H-8) with a shorting clip.</li> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul> <p>• After the adjustment, remove the shorting clip.</p>	<p>TP7/EN-66A(J-10)</p>  <p>When connecting TP5 to TP6</p> <p><math>A=16\pm1\mu\text{sec}</math> Read at the end of jitter. TRIG: TP4/EN-66A(J-10)</p>	<p>RV9/EN-66A(I-5)</p>
<p>Step 2.</p> <ul style="list-style-type: none"> <li>• Connect TP6 on the EN-66A Board(H-8) to E2 on the EN-66A Board(H-8) with a shorting clip.</li> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul> <p>• After the adjustment, remove the shorting clip.</p>	<p>TP7/EN-66A(J-10)</p>  <p>When connecting TP6 to E2</p> <p><math>A=16\pm1\mu\text{sec}</math> Read at the top of jitter. TRIG: TP4/EN-66A(J-10)</p>	<p>RV8/EN-66A(I-5)</p>

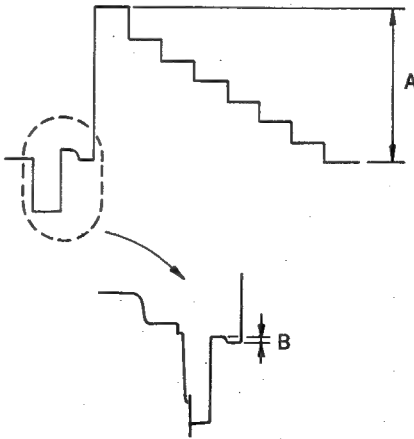
## 12-33. EXPAND CCD LINEARITY ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the Quad Phase signal portion on the alignment tape CR5-1B PS.</li> <li>• WAVEFORM MONITOR: DIFF'D STEP mode</li> </ul>	<p>TP14/EN-66A(A-11)</p>  <p><math>A = 0 \pm 1\%</math> TRIG: TP12/EN-66A(C-12)</p>	<ul style="list-style-type: none"> <li>● RV17/EN-66A(E-10)</li> <li>● RV21/EN-66A(E-12)</li> </ul>
	<p>TP15/EN-66A(A-11)</p>  <p><math>A = 0 \pm 1\%</math> TRIG: TP12/EN-66A(C-12)</p>	<ul style="list-style-type: none"> <li>● RV15/EN-66A(E-10)</li> <li>● RV19/EN-66A(E-11)</li> </ul>

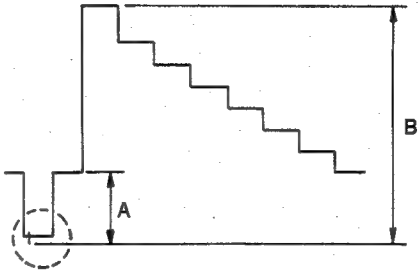
## 12-34. EXPAND CCD OUTPUT LEVEL ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP14/EN-66A(A-11)</p>  <p>Spec 1: Minimize the level Spec 2: <math>A=0.93\pm0.01V</math></p> <p>TRIG: TP4/EN-66A(J-10)</p>	<p>Spec 1. ● RV16/EN-66A(E-11) Spec 2. ● RV22/EN-66A(A-12)</p>
	<p>TP15/EN-66A(A-11)</p>  <p>Spec 3: Minimize the level Spec 4: <math>A=0.93\pm0.01V</math></p> <p>TRIG: TP4/EN-66A(J-10)</p>	<p>Spec 3. ● RV14/EN-66A(E-10) Spec 4. ● RV23/EN-66A(A-11)</p>

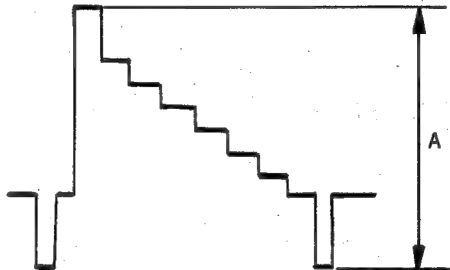
## 12-35. VIDEO OUTPUT LEVEL ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• S303/EN-66A(G-2): OFF</li> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> <li>• WAVEFORM MONITOR</li> <li>• After the adjustment, set S303 to the ON position.</li> </ul>	<p>VIDEO OUT connector (terminated at 75 ohms)</p>  <p>Spec 1: <math>A=0.7\pm0.01V</math> Spec 2: <math>B=0\pm0.01V</math></p>	<p>Spec 1. ● RV324/EN-66A(B-4) Spec 2. ● RV326/EN-66A(E-1)</p>

## 12-36. Y SYNC REPLACEMENT ADJUSTMENT

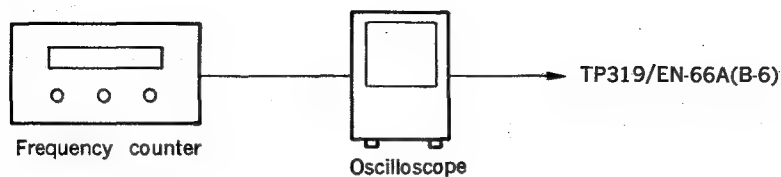
Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• S303/EN-66A(G-2): OFF</li> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>VIDEO OUT connector (terminated at 75 ohms)</p>  <p><math>A = 0.285 \pm 0.01</math></p>	<p>RV327/EN-66A(D-1)</p>
<ul style="list-style-type: none"> <li>• After the adjustment, set S303 to the ON position.</li> </ul>	<p>Check: <math>B = 0.985 \pm \begin{smallmatrix} 0 \\ -0.02 \end{smallmatrix} V</math></p>	

## 12-37. Y OUTPUT LEVEL ADJUSTMENT (Y/C MONITOR)

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• S303/EN-66A(G-2): OFF</li> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP326/EN-66A(B-2)</p>  <p><math>A = 0.7 \pm 0.01V</math></p>	<p>RV322/EN-66A(B-2)</p>
<ul style="list-style-type: none"> <li>• After the adjustment, set S303 to the ON position.</li> </ul>		

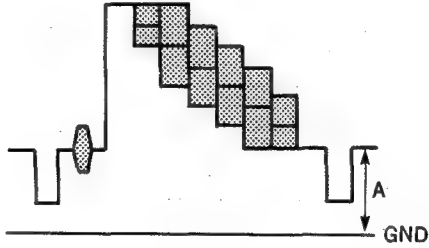
## 12-38. 4.43MHz OSC ADJUSTMENT

[Connection]

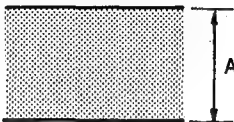


Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Wait for more than three minutes after the power is turn on.</li> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> <li>• Frequency counter</li> </ul>	<p>TP319/EN-66A(B-6)</p> <p>4433618±5Hz</p>	<p>● CV301/EN-66A(G-10)</p>

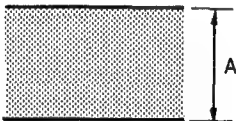
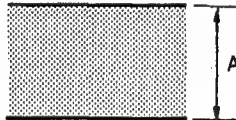
## 12-39. CLAMP ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP327/EN-66A(A-2)</p>  <p>A=2±0.02Vdc</p>	<p>● RV323/EN-66A(A-4)</p>

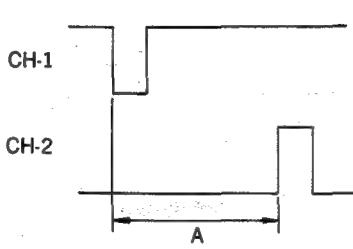
## 12-40. SC TUNING ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	TP320/EN-66A(B-6)  Maximize the level A, ( $A \approx 3V$ )	⚙️ LV301/EN-66A(B-7)

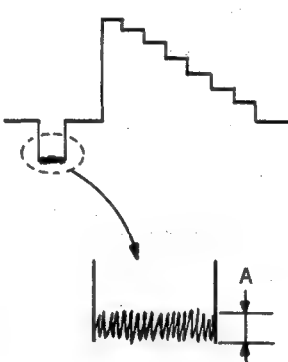
## 12-41. U/V LEVEL ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	TP321/EN-66A(B-6) U-Axis  $A = 0.6 \pm 0.05V$	U Axis: ⚙️ RV318/EN-66A(B-5) V Axis: ⚙️ RV320/EN-66A(B-6)
	TP322/EN-66A(B-6) V-Axis  $A = 0.6 \pm 0.05V$	

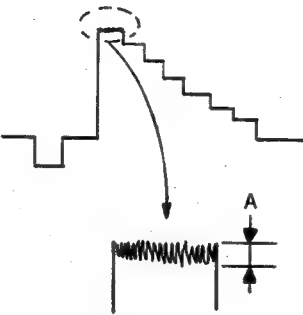
## 12-42. CLAMP PULSE ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>CH-1: TP301/EN-66A(G-6) CH-2: TP313/EN-66A(D-9)</p>  <p><math>A = 8.1 \pm 0.05 \mu\text{sec}</math></p>	<ul style="list-style-type: none"> <li>• RV308/EN-66A(E-6)</li> </ul>

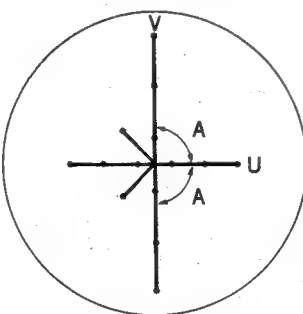
## 12-43. CHROMA BLANKING ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> <li>• WAVEFORM MONITOR</li> </ul>	<p>VIDEO OUT Connector (terminated at 75 ohms)</p>  <p>Minimize the level A.</p>	<p>B-Y (Horizontal Axis): • RV313/EN-66A(B-9) R-Y (Vertical Axis): • RV315/EN-66A(B-9)</p> <ul style="list-style-type: none"> <li>• Adjust alternately.</li> </ul>

## 12-44. CHROMA CARRIER BALANCE ADJUSTMENT

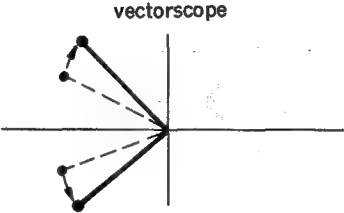
Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> <li>• WAVEFORM MONITOR (RESPONSE=4.43)</li> </ul>	<p>VIDEO OUT Connector (terminated at 75 ohms)</p>  <p>Minimize the level A.  <math>A \leq 2\text{IRE}</math></p>	<p>B-Y (Horizontal Axis):            ⌚ RV312/EN-66A(B-10)            R-Y (Vertical Axis):            ⌚ RV314/EN-66A(B-9)</p> <ul style="list-style-type: none"> <li>• Adjust alternately.</li> </ul>

## 12-45. CHROMA BALANCE VERTICAL ADJUSTMENT

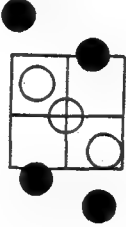
Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the quad phase signal on the alignment tape CR5-1B PS.</li> </ul>	<p>VIDEO OUT Connector (terminated at 75 ohms)</p> <p>Vectorscope</p>  <p><math>A \rightarrow 90^\circ</math></p>	<p>⌚ RV319/EN-66A(C-6)</p>



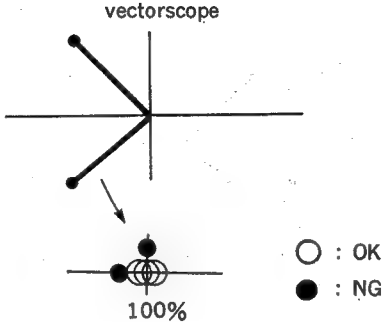
## 12-46. BURST BALANCE ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> <li>• Set the vectorscope gain to UNCAL, and adjust so that R and C<sub>v</sub> are located in "田".</li> <li>• Set the vectorscope to NTSC mode, and adjust so that two burst are located of PHASE VR.</li> <li>• Vectorscope: PAL mode</li> <li>• After the adjustment, set the vectorscope gain to CAL</li> </ul>	<p>VIDEO OUT Connector (terminated at 75 ohms)</p>  <p>The burst level should be same to burst line of vectorscope.</p>	<p>RV316/EN-66A(B-7)</p>

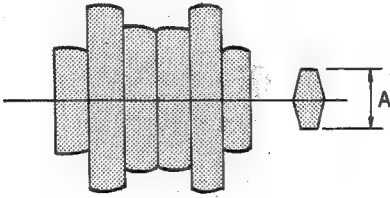
## 12-47. CHROMA BALANCE ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> <li>• Set the vectorscope gain to UNCAL, and adjust so that "R" and "Cr" are located in "田".</li> </ul>	<p>VIDEO OUT Connector (terminated at 75 ohms)</p> <p>Luminescent spots on vectorscope</p>  <p>○ : OK ● : NG</p> <p>Repeat until twelve luminescent spots satisfy the specification.</p>	<p>RV311/EN-66A(A-10)</p>

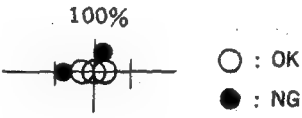
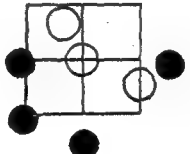
## 12-48. BURST LEVEL ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> <li>• Set the vectorscope gain to UNCAL position, and adjust so that the twelve luminescent spots are located in “田”.</li> <li>• After the adjustment, set the vectorscope gain to CAL.</li> </ul>	<p>VIDEO OUT Connector (terminated at 75 ohms)</p>  <p>Set the burst's luminescent spot to the 100% position on the BURST axis.</p>	<p>● RV317/EN-66A(C-9)</p>

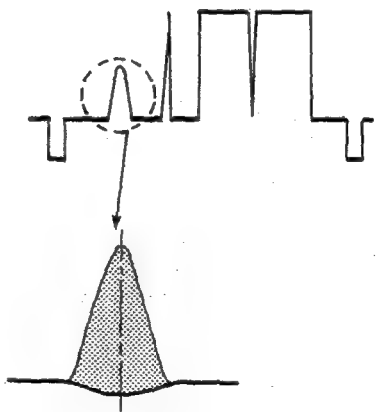
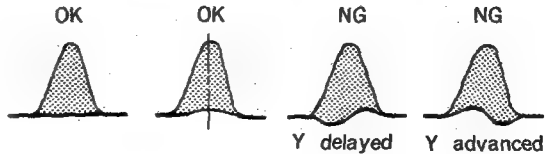
## 12-49. CHROMA OUTPUT LEVEL ADJUSTMENT (Y/C MONITOR)

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP324/EN-66A(B-4)</p>  <p><math>A=0.6\pm0.02V</math></p>	<p>● RV321/EN-66A(B-5)</p>

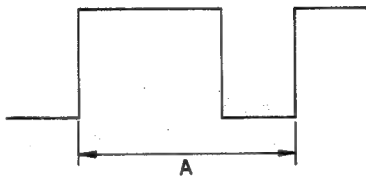
## 12-50. CHROMA VIDEO OUTPUT LEVEL ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>VIDEO OUT Connector (terminated at 75 ohms)</p> <p>vectorscope</p> <p>Burst's luminescent spot: 100%</p> <p>100%</p>  <p>○ : OK ● : NG</p> <p>12 luminescent spots: A third part of the luminescent spot should be located in "田" respectively.</p> 	<ul style="list-style-type: none"> <li>RV325/EN-66A(B-4)</li> </ul>

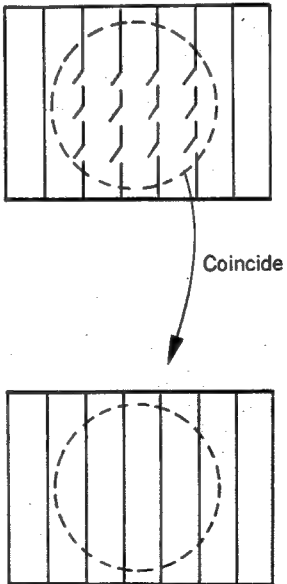
## 12-51. Y/C DELAY ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<p>Step 1.</p> <p>Metal mode:</p> <ul style="list-style-type: none"> <li>Play back the Bowtie &amp; 10T signal on the alignment tape CR5-1B PS.</li> <li>Set the line selector in the waveform monitor to OFF.</li> </ul>	<p>VIDEO OUT Connector (terminated at 75 ohms)</p>  <p>The peak is located in the center.</p>  <p>OK OK NG NG</p> <p>Y delayed Y advanced</p>	<p>Metal mode:</p> <ul style="list-style-type: none"> <li>RV301/EN-66A(F-5)</li> </ul> <p>Oxide mode:</p> <ul style="list-style-type: none"> <li>RV26/EN-66A(K-12)</li> </ul>
<p>Step 2.</p> <p>Oxide mode:</p> <ul style="list-style-type: none"> <li>Play back the Bowtie &amp; 10T signal on the alignment tape CR5-2A PS.</li> <li>Set the line selector in the waveform monitor to OFF.</li> </ul>		

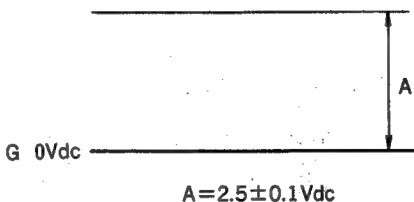
## 12-52. FALSE H SYNC FREQUENCY ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• S301/EN-66A(K-2): OFF</li> <li>• Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP305/EN-66A(F-6)</p>  <p><math>A = 68 \pm 1 \mu\text{sec}</math></p>	<p>RV302/EN-66A(F-6)</p>
<ul style="list-style-type: none"> <li>• S301/EN-66A(K-2): ON</li> </ul>	<p>Check that should be <math>A = 64 \pm 1 \mu\text{sec}</math>.</p>	

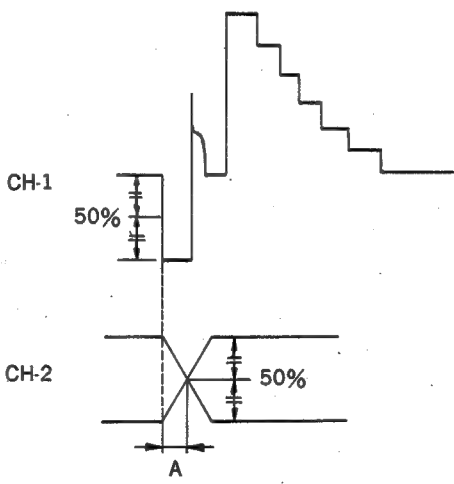
## 12-53. FREE-RUN TIMING ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the color bar (DO) signal on the alignment tape CR5-1B PS.</li> <li>• Turn the TRACKING control VR counterclockwise or clockwise direction to generate the chroma tearing by sync disturbance.</li> </ul>	<p>VIDEO OUT Connector (terminated at 75 ohms)</p>  <p>When turning the TRACKING control VR counterclockwise or clockwise direction, the chroma tearing by sync disturbance should not appear and adjust to coincide before and after.</p> <p>*Red or green noise may appear. This noise is not related to this adjustment.</p>	<p>RV11/EN-66A(J-10)</p>

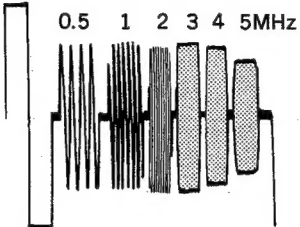
## 12-54. H LOCK SC VCO ERROR ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>TP602/EN-66A(F-7)</p>  <p>G 0Vdc</p> <p><math>A = 2.5 \pm 0.1Vdc</math></p>	<p>● LV601/EN-66A(G-7)</p>

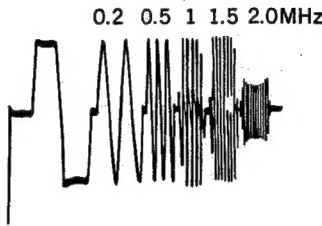
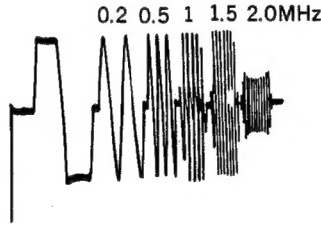
## 12-55. H LOCK SC VCO DELAY ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back the color bar signal on the alignment tape CR5-1B PS.</li> </ul>	<p>CH-1: TP311/EN-66A(E-2)</p> <p>CH-2: TP323/EN-66A(A-7)</p>  <p>CH-1</p> <p>50%</p> <p>CH-2</p> <p>50%</p> <p>A</p> <p><math>A = 2.5 \pm 0.2 \mu sec</math></p>	<p>● RV601/EN-66A(F-8)</p>

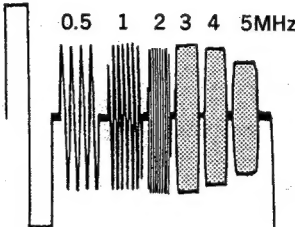
## 12-56. Y FREQUENCY RESPONSE CHECK (METAL)

Machine conditions for adjustment	Specifications	Adjustments												
<ul style="list-style-type: none"><li>• S303/EN-66A(G-2): OFF</li><li>• Play back the multi burst signal on the alignment tape CR5-1B PS.</li></ul>	<p>VIDEO OUT Connector (terminated at 75 ohms)</p>  <p>Spec 1.</p> <table><tr><th>frequency</th><th>level</th></tr><tr><td>0.5MHz</td><td>100%(reference)</td></tr><tr><td>1MHz</td><td>100±5%</td></tr><tr><td>2MHz</td><td>100±10%</td></tr><tr><td>4MHz</td><td>90±15%</td></tr><tr><td>5MHz</td><td>70±15%</td></tr></table> <p>Spec 2.</p> <p>The difference between CH-A and CH-B should be within 5%.</p>	frequency	level	0.5MHz	100%(reference)	1MHz	100±5%	2MHz	100±10%	4MHz	90±15%	5MHz	70±15%	
frequency	level													
0.5MHz	100%(reference)													
1MHz	100±5%													
2MHz	100±10%													
4MHz	90±15%													
5MHz	70±15%													
<ul style="list-style-type: none"><li>• After the adjustment, set S303 to the former position.</li></ul>	TRIG: TP12/DM-74(J-2)													

## 12-57. CHROMA FREQUENCY RESPONSE CHECK (METAL)

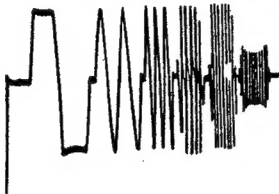
Machine conditions for adjustment	Specifications	Adjustments										
• Play back the multi burst signal on the alignment tape CR5-1B PS.	TP315/EN-66A(A-7)    Spec 1. <table border="1" data-bbox="676 835 967 1014"><thead><tr><th>frequency</th><th>level</th></tr></thead><tbody><tr><td>0.2MHz</td><td>100%(reference)</td></tr><tr><td>0.5MHz</td><td>100±10%</td></tr><tr><td>1MHz</td><td>100±10%</td></tr><tr><td>1.5MHz</td><td>85±15%</td></tr></tbody></table>  Spec 2. The difference between CH-A and CH-B should be within 5%.  TRIG: TP12/DM-74(J-2)	frequency	level	0.2MHz	100%(reference)	0.5MHz	100±10%	1MHz	100±10%	1.5MHz	85±15%	
	frequency	level										
0.2MHz	100%(reference)											
0.5MHz	100±10%											
1MHz	100±10%											
1.5MHz	85±15%											
	TP318/EN-66A(B-7)    Spec 1. <table border="1" data-bbox="678 1597 968 1776"><thead><tr><th>frequency</th><th>level</th></tr></thead><tbody><tr><td>0.2MHz</td><td>100%(reference)</td></tr><tr><td>0.5MHz</td><td>100±10%</td></tr><tr><td>1MHz</td><td>100±10%</td></tr><tr><td>1.5MHz</td><td>85±15%</td></tr></tbody></table>  Spec 2. The difference between CH-A and CH-B should be within 5%.  TRIG: TP12/DM-74(J-2)	frequency	level	0.2MHz	100%(reference)	0.5MHz	100±10%	1MHz	100±10%	1.5MHz	85±15%	
frequency	level											
0.2MHz	100%(reference)											
0.5MHz	100±10%											
1MHz	100±10%											
1.5MHz	85±15%											

## 12-58. Y FREQUENCY RESPONSE CHECK (OXIDE)

Machine conditions for adjustment	Specifications	Adjustments												
<ul style="list-style-type: none"><li>• S303/EN-66A(G-2): OFF</li><li>• Play back the multi burst signal on the alignment tape CR5-2A PS.</li></ul>	<p>VIDEO OUT Connector (terminated at 75 ohms)</p>  <p>Spec 1.</p> <table><tr><th>frequency</th><th>level</th></tr><tr><td>0.5MHz</td><td>100%(reference)</td></tr><tr><td>1MHz</td><td>100±10%</td></tr><tr><td>2MHz</td><td>100±10%</td></tr><tr><td>3MHz</td><td>95±15%</td></tr><tr><td>4MHz</td><td>75±15%</td></tr></table> <p>Spec 2.</p> <p>The difference between CH-A and CH-B should be within 5%.</p>	frequency	level	0.5MHz	100%(reference)	1MHz	100±10%	2MHz	100±10%	3MHz	95±15%	4MHz	75±15%	
frequency	level													
0.5MHz	100%(reference)													
1MHz	100±10%													
2MHz	100±10%													
3MHz	95±15%													
4MHz	75±15%													
<ul style="list-style-type: none"><li>• After the adjustment, set S303 to the ON position.</li></ul>	TRIG: TP12/DM-74(J-2)													



## 12-59. CHROMA FREQUENCY RESPONSE CHECK (OXIDE)

Machine conditions for adjustment	Specifications	Adjustments										
<ul style="list-style-type: none"><li>• Play back the multi burst signal on the alignment tape CR5-2A PS.</li></ul>	<p>TP318/EN-66A(B-7)</p> <p>0.2 0.5 1 1.5 2.0MHz</p>  <p>Spec 1.</p> <table><tr><th>frequency</th><th>level</th></tr><tr><td>0.2MHz</td><td>100%(reference)</td></tr><tr><td>0.5MHz</td><td>100±10%</td></tr><tr><td>1MHz</td><td>100±10%</td></tr><tr><td>1.5MHz</td><td>85±15%</td></tr></table> <p>Spec 2.</p> <p>The difference between CH-A and CH-B should be within 5%.</p> <p>TRIG: TP12/DM-74(J-2)</p>	frequency	level	0.2MHz	100%(reference)	0.5MHz	100±10%	1MHz	100±10%	1.5MHz	85±15%	
frequency	level											
0.2MHz	100%(reference)											
0.5MHz	100±10%											
1MHz	100±10%											
1.5MHz	85±15%											